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Volume 3
Number 6
August 1985
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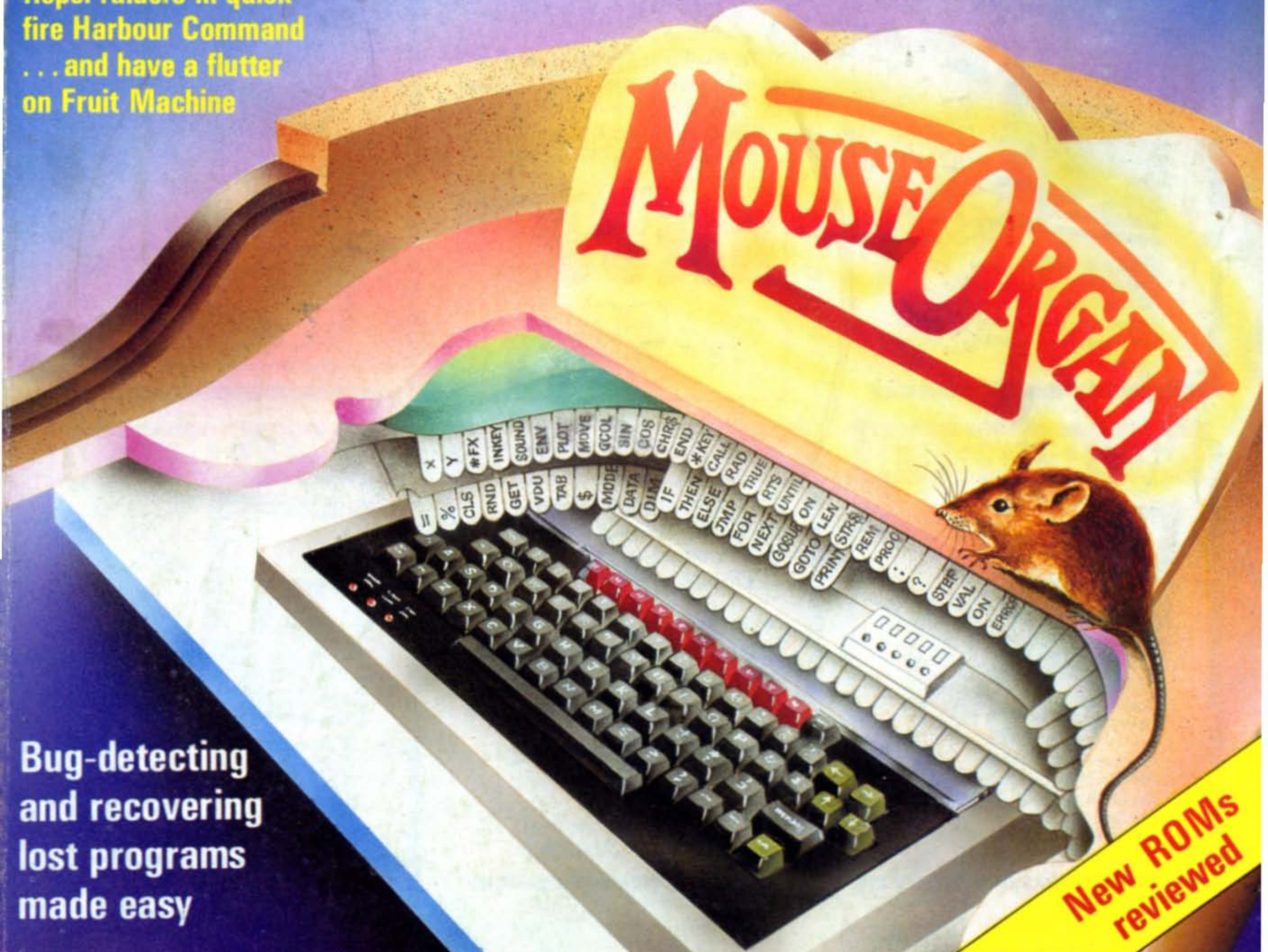

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July-December 1984

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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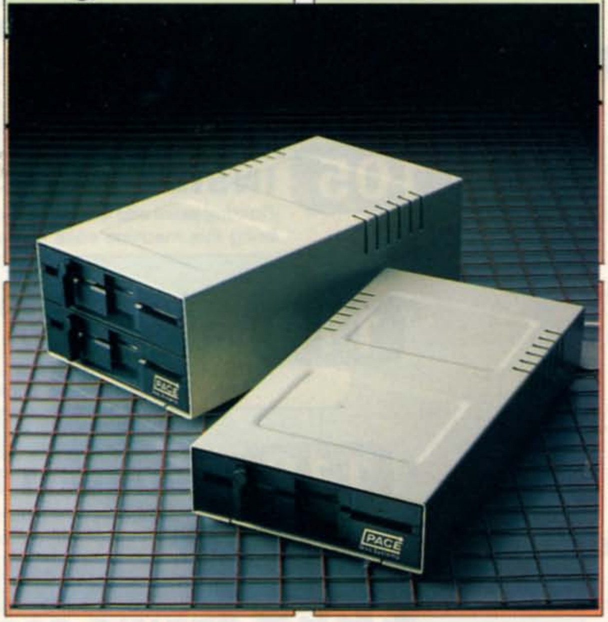
PEAK OF PERFECTION



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New Computer Games For Solidisk Sideways RAM

SOLIDISK's SIDEWAYS RAM is an almost indispensible add-on for the BBC user.

It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it.

To date, more than 40,000 units have been sold.

The sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.

This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.

The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.

Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run.

For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.

These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc . . . and Solidsk Most Advanced Disk filing System version 2.0.

Another extremely interesting use is to run Solidisk 'Megagames'. They are too large for the non expanded BBC computer, as they make use of high resolution 8 colour (mode 2) screen, background music, sound and sprites at the same time.

Around 70 megagames are planned for release in 5 Megagames Packs at the official Acorn Show (25-28 July 85). Each Pack consists of 5 diskettes, available in either 40 or 80 tracks.

PRICES

The listed price comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and software pack 1 consisting of 5 diskettes formatted either in 40 or 80 track.

- SWR32 + 5 discs (32k unit, by far the most popular): £58.00
- SWR64 + 5 discs (64k unit, new introduction model): £85.00
- SWR128 + 5 discs (128k unit, the second most popular): £135.00
- Any Extra Software Pack (5 discs): £10.00. Specify 40 or 80 tracks.

As Solidisk Software Support Service has to produce in excess of 25,000 diskettes every month, we regret that we can no longer provide personalised service for disk washing. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost i.e. £10.00 for 5 disks, including new manual, post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment for the difference.

The listed prices include new manuals when necessary.

SOFTWARE PACK 1

(included with SWR)

The Software package comprises 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:
Volume 1 contains all the general applications of Sideways RAM. Menu, Printer Buffer, STL DFS 2.0, STL E00, RAMDISK, RFS (Rom generator), Fast Backup, Quickcopy, Index etc . . .

Volume 2:
Volume 2 contains the Solidisk Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:
Volume 3 contains the Solidisk Macro Basic (a program generator), a Linker-Editor, VMP the Virtual Memory Program, Sigen, a program to create your own dictionary and a sample French dictionary.

Volume 4:
Volume 4 contains the Solidisk Database.

Volume 5:
Volume 5 contains the Solidisk Sprites System.

SOFTWARE PACK 2

(optional)

Volume 6:
Volume 6 contains the Solidisk Spreadsheet.
Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 7:
Volume 7 contains Solidisk Play Tunes System and lots of tunes and write music using ordinary ABCD notation.

Volume 8:
STL Toolkit has 24 star commands (Status, Rwipe, Check, Find, Search and Replace, Mode 8, Join, Keyload, LVAR, Salvage, Expand, Edit etc . . .).
STL SFX is Solidisk screen effects utility. In mode 2, you can scale, move, reverse, mirror etc with superlative ease.
VDURECORDER is another screen aid utility. It remembers everything sent to the screen. When you want it, *REPLAY will show it all over again but with an incredible speed.
Solimon is a machine code monitor for both 6502 and 65C02.

Volume 9:
Volume 9 contains the STL ADFS and disc utilities (see next page).

Volume 10:
Volume 10 contains the Solidisk Teletext Editor.

Megagame Packs:
Around 70 games are currently under compilation.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

WHAT THE SPECIALISTS SAY:

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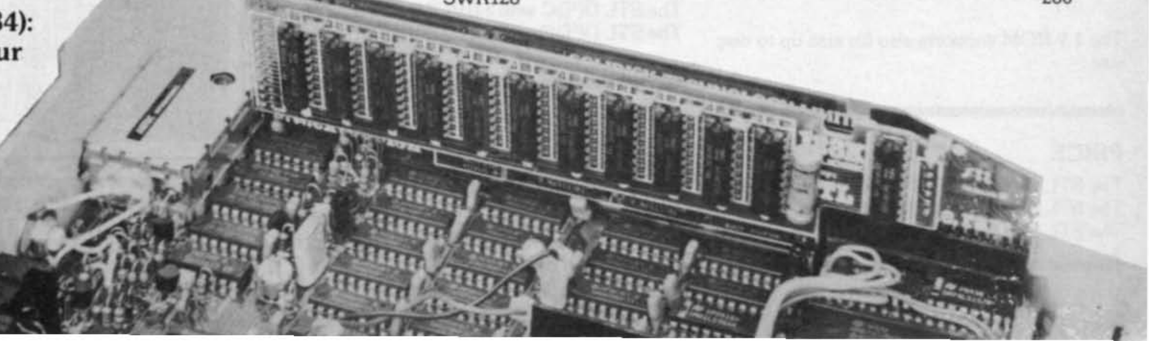


You Only Fit Disks Once. Fit the Best.

The SOLIDISK Double Density DFS is now the ultimate in reliability with a minimum component count and excellent software. The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike. It can now run all Acornsoft games (such as Elite, Aviator, Revs, Magic Mushrooms etc. . .) and most other protected discs (Castle Quest, Island's Music system etc. . .)

SOLIDISK relies on a good product and a large support network to win the heart of the user.

With over 75 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users.

Even users who are new to the Disc System can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility for over 50,000 users and the ability to give you the best possible support matched only by the largest companies.

WHICH DFS DO YOU NEED?

SOLIDISK produce no less than three types of Disc Filing Systems to cover all your requirements.

1. THE FLEXIBLE DDFS

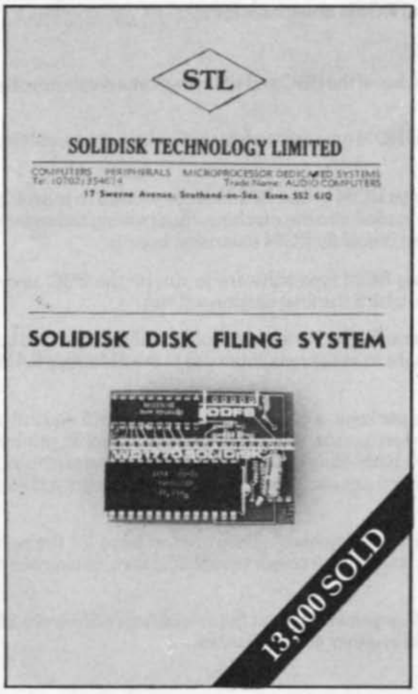
The basic SOLIDISK DDFS is suitable for all ordinary users.

The 1.9 ROM handles both single and double density formats, with built in disc formatter and verifier, along with such features as automatic density sensing and 40/80 track software controlled switching. The disc speed is programmable by the keyboard links to suit almost any type of disc drive.

The 1.9 ROM supports also file size up to disc size.

PRICE

The STL DDFS with 1.9 ROM	£40.00
The STL DDFS with 2.0 ROM	£45.00
The STL DDFS with 2.1 ADFS	£55.00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2. THE DFDC TO UPGRADE ACORD DFS:

Ideally suitable if you already have an Acorn DFS. The DFDC will not only add Double Density capability but also improve the speed of your 8271 chip.

The SOLIDISC DFDC (Dual Floppy Disc Controllers) is making a very large impact on the BBC user community with its versatility.

The DFDC board simply sits in the place of the 8271 FDC chip (i.c. 78) in the BBC. The 8271 is then inserted into the DFDC board and the ROM 2.0 inserted in place of the original DFS ROM.

Once the machine is up and running it is then simplicity itself to change FDC's; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

PRICE

The STL DFDC with 2.0 ROM	£55.00
The STL DFDC with 2.1 ADFS	£65.00

THE SOLIDISK WINCHESTER DISC SYSTEM (XD20-40)

This most powerful Winchester system for the BBC computer to date plugs straight into the 1Mhz bus in a few seconds. Based around the WD1002 SHD controller, Mitsubishi Winchester drive, Astec PSU and the Solidisk ADFS 2.1, it offers 20 Megabytes (26 MB unformatted) and can easily be upgraded to a theoretical maximum of 1300 Gigabytes.

Its phenomenal capacity, huge potential and excellent features make the most expensive Winchester systems look green.

On the technical side, it has very fast seek and an exceptionally low skew factor of 11 (meaning 3 sectors are read or written in one single revolution). It gets ready very quickly too, needing only a few seconds from power up.

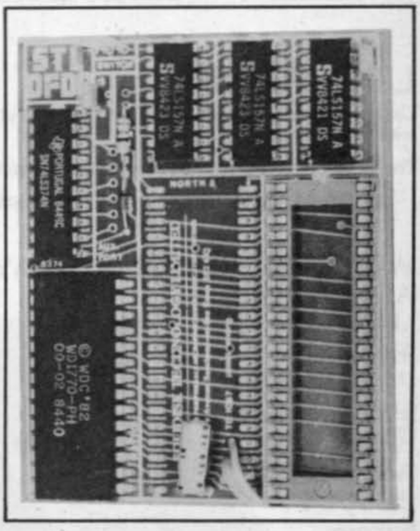
Unlike many other sources of Winchester disc drives, Solidisk Winchester system is properly driven by the Solidisk ADFS 2.1 ROM, compatible with Acorn Winchester specifications and with Acornsoft View, Viewsheet and Viewstore database.

It also runs Gemini's Datagem and Acorn second processors.

It has nice features such as read after write, Password protection, Automatic Winchester to Winchester and Winchester to floppies Backup facilities and a fantastic average file transfer speed of 64k bytes per second.

PRICE:

20 MB Winchester (excluding VAT)	£700.00
30 MB Winchester (excluding VAT)	£900.00
40 MB Winchester (excluding VAT)	£1100.00
60 MB Winchester (excluding VAT)	£1300.00



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YOU SHOULD KNOW ABOUT ADFS AND USE IT

ANNOUNCING THE SOLIDISK ADFS 2.1

What is important on a Disc Filing System is how effectively it uses the disc, how fast it loads the programs, how many entries are on the disc and how big they are.

The old BBC DFS leaves most 80 track discs half empty on side 0 and wastes side 2 of most double sided discs.

The new ADFS treats side 0 and side two (if available) as a single disc and uses them to the full.

The old BBC DFS uses single density, the ADFS double density which is twice as fast and stores twice as much.

The old BBC DFS can only handle 31 files of less than 256k bytes in size.

The ADFS can handle thousands of files, up to 600 Gigabytes in size!

If you are afraid that the ADFS is complicated to learn, don't be put off. It isn't complicated at all.

Most of the commands are the same in both systems and the ADFS ones are very much intuitive.

If you know the BBC DFS, a few hours are all you need to master the new ADFS.

You won't regret it. After all, each ADFS disc saves you £2.00 or more on media cost, and the ADFS ROM will pay for itself in a few days.

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DFS and Acorn BBC Plus users.

This massive piece of software is supplied on two 16k ROMs for the BBC B computers or on a 32k ROM for the BBC Plus computers. It supports both the old BBC DFS and the Acorn ADFS. It also provides the users with 20 extra disc utilities.

Standard features for both implementations include:

1) Automatic Write Error Correction.
Every disk write operation is automatically followed by a read operation to ensure that the recorded data is free of all errors. Then if need be, the STL ADFS 2.1 will restart the write operation from the unsafe sector.

2) Automatic 40/80 track stepping.
The STL ADFS will let you read and write 40 track discs on an 80 track drive and copy over from any format to any other format.

3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.

4) Tape to disc facilities.
Direct transfer from tapes to disc (*TAPEDISC) will work with all unprotected programs. *TAPELOAD and *TAPESAVE will cope with more difficult ones. Only in some cases (multipart games cassettes) will you need Solidisk tape copier.

5) Wordprocessing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed in any screen mode.

6) automatic disc sensing.
On Shift Break, the STL ADFS will automatically detect the disc format and use the right disc filing system to run it.

Special features for the ADFS implementation:

1) Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) allow you to format ADFS discs in any drive.

2) Disc verifying facilities.
*VERIFY will check all disc sizes including Winchester for media defects.

3) Number of opened channels.
This is one of the star features of Solidisk ADFS.

This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as in the Acorn ADFS.

It leaves PAGE at &1900 for most programs, gives extra memory to View and Viewsheet and also avoids unnecessary conversion work on programs originated for the BBC DFS.

Special features for the BBC DFS implementation.

Solidisk ADFS 2.1 handles both single and double density. In addition, it supports:

1) Unlimited catalogue entries (up to disc capacity) without any preparation.

2) Unlimited filesize.

3) Automatic media detection.

8) PRICE

2.1 ROM set	£20.00
Upgrade from 1.9	£15.00
Upgrade from 2.0	£10.00

SOLIDISK KEYBOARD AND CPU

ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to typists (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. Good ventilation to the power supply too and hides all untidy cables away.

PRICE

The complete CPU and keyboard case costs £30.000 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer.

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SOLIDISK MITSUBISHI DISC OFFER

A Complete Disc System containing everything you need, including 1 Blank Diskette, at a new low price of only £199.00 inclusive.

The Mitsubishi Offer Comprises:

- One Mitsubishi MF4853, Double Sided, 80 Track Disc Drive. Cased in beige with all leads.
- One Solidisk DDFS complete Disc Upgrade with 2.0 ROM.
- 1 Verbatim MD525 Blank Diskette.
- 1 Software Pack and User Manuals.
- Full one year guarantee.

PRICE: 200.00.

HARDWARE:
As described earlier as shown opposite.

THE SOFTWARE:
The software comprises 5 diskettes, formatted in 80 tracks.

DataLife
Verbatim

Volume 1:
Solidisk Word Processor and Spelling checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP filename , then start typing. What you see on the screen will be exactly printed on paper.

Most useful commands are all displayed on the top part of the screen.

It features 80 column screen throughout with direct on screen justification, automatic margins, page numbering, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, *commands etc. Solidisk WP loads and saves texts in under 1 second flat and also you may save the edited version as many times and under any filename you like.

It has the unusual ability to spellcheck your document without leaving it, simply by typing in Control-U.

It has self dictionary generating capability too. You may create any dictionary you like by just simply entering the words.

Solidisk WP is also excellent as secretarial training for Wordstar.

Volume 2:
Volume 2 contains Solidisk Database. It is a random access system, completely menu driven and easily customised to suit any particular filing need.

It features unlimited filesize and number of records, supports all maths functions and 80 column screen throughout.

It is simple to understand and to use. You take one of the 15 different options to start. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design new databases list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. . . We use it to process all your orders.

Volume 3:
Volume 3 contains Solidisk Spreadsheet. Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.

Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 4:
Volume 4 contains the Solidisk tape to disc program and a selection of computer games.

Volume 5:
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Short form price list.

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SWR64	£85.00	£1.00
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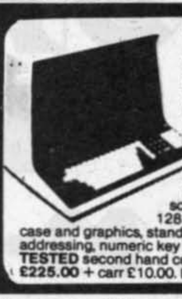

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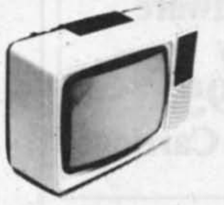

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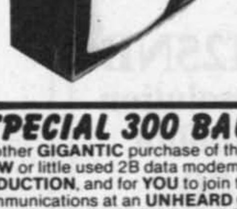

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So now you have got your home computer, you're ready to talk to Cumana – the best name in memory. Already a market leader throughout Europe for their range of disk drives, Cumana now have other products on offer, all to the same exacting standards that have made their disk drives the number one choice in the home and in education.

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The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

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Cumana have spent years on research, development and marketing a range of drives second to none. Their drives are compatible with BBC, Spectrum, Dragon, Oric, Tandy Models III and 4 and Video Genie. They are fully guaranteed for 12 months and approved for electrical safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disk drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you in the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.

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- 10 user-defined variables to simplify complex calculations
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- Solidisk/Econet/6502 second processor compatible
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD-CALC *£29.95*

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
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- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
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- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- Solidisk/Econet/6502 second processor compatible
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

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- Stunning menu driven colour graphics using the BBC's capability to the full
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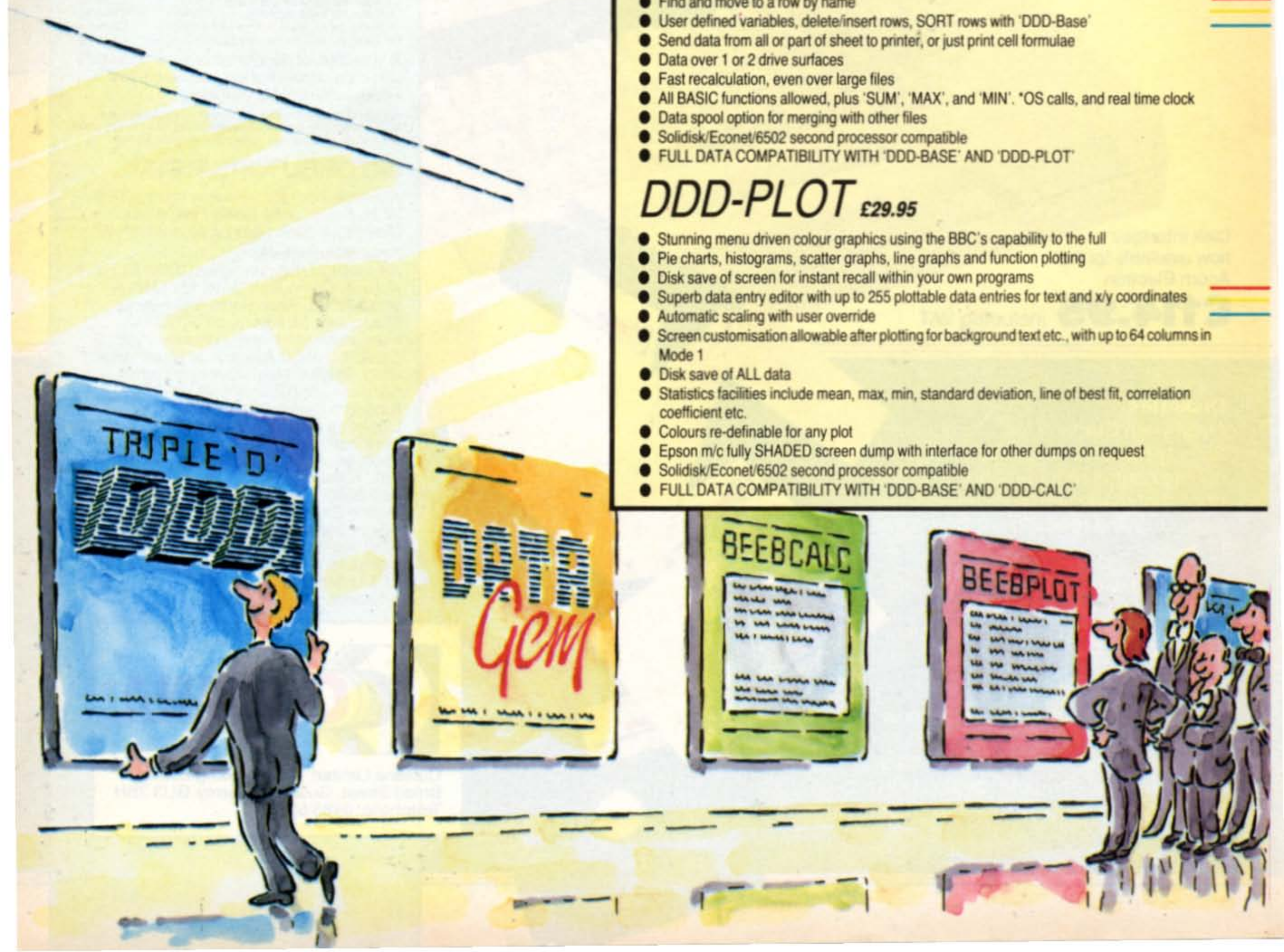
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'



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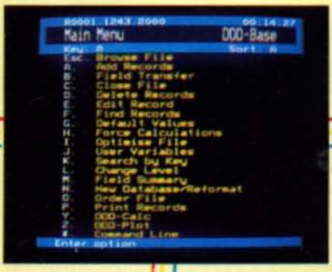
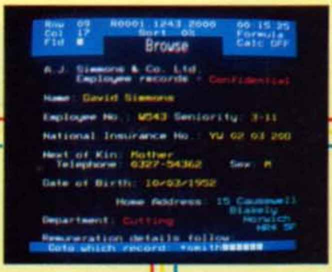
DHubbard

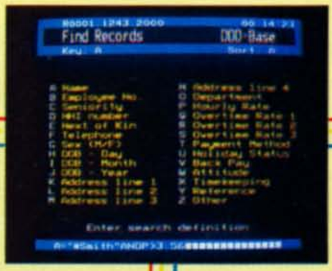
Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited



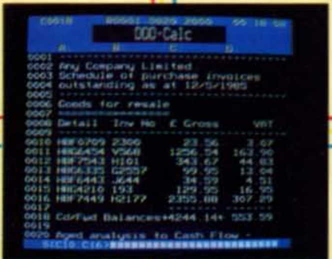
```
R0001 1243 2000            00 14 27
Main Menu                  DDD-Base
Key: A                     Sort: A
Esc.  Browse File
A.    Add Records
B.    Field Transfer
C.    Close File
D.    Delete Records
E.    Edit Record
F.    Find Records
G.    Default Values
H.    Force Calculations
I.    Optimise File
J.    User Variables
K.    Search by Key
L.    Change Level
M.    Field Summary
N.    New Database/Reformat
O.    Order File
P.    Print Records
Y.    DDD-Calc
Z.    DDD-Plot
#.    Command Line
 Enter option
```



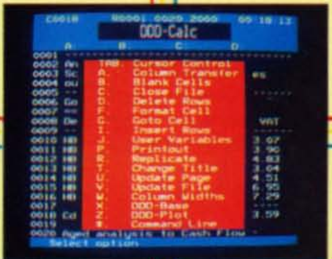
```
Row  09   R0001 1243 2000   00 15 25
Col  17       Sort  05      Formula
Fld  ■       Browse         Calc OFF

A.J. Simmons & Co. Ltd.
     Employee records : Confidential

Name: David Simmons

Employee No.: W543 Seniority: 3-11

National Insurance No.: YU 02 03 20D

Next of Kin: Mother
  Telephone: 0327-54362       Sex: M

Date of Birth: 10/03/1952

            Home Address: 15 Causewell
                                Blakely
Department: Cutting             Norwich
                                 NR4 5F
Remuneration details follow:
 Goto which record: *smith■■■■■■■
```



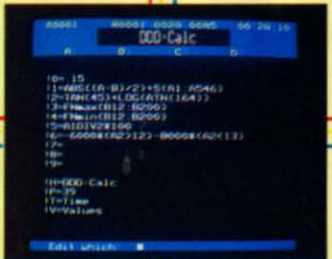
```
R0001 1243 2000               00 14 23
Find Records                  DDD-Base
Key: A                        Sort: A


A Name                  N Address line 4
B Employee No.          O Department
C Seniority             P Hourly Rate
D NHI number            Q Overtime Rate 1
E Next of Kin           R Overtime Rate 2
F Telephone             S Overtime Rate 3
G Sex (M/F)             T Payment Method
H DOB - Day             U Holiday Status
I DOB - Month           V Back Pay
J DOB - Year            W Attitude
K Address line 1        X Timekeeping
L Address line 2        Y Reference
M Address line 3        Z Other

          Enter search definition

  A="#Smith"ANDP>3.56■■■■■■■■■■■■■■■■■
```



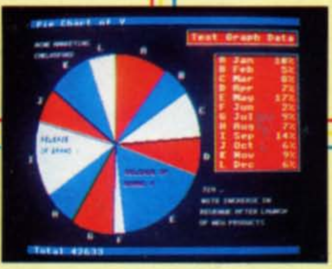
```
C0018     R0001 0020 2000     00 18 58
             DDD-Calc
   A.       B.        C.        D.
0001 --------------------------------------
0002 Any Company Limited
0003 Schedule of purchase invoices
0004 outstanding as at 12/5/1985
0005 --------------------------------------
0006 Goods for resale
0007 ===================
0008 Detail  Inv No  £ Gross       VAT
0009 --------------------------------------
0010 HBF6709 2306        23.56      3.07
0011 HBG6454 V568     1256.54    163.90
0012 HBF7543 H101      343.67     44.83
0013 HBG6335 G2557      99.95     13.04
0014 HBF6443 J644       34.59      4.51
0015 HBG4210 193       129.95     16.95
0016 HBF7449 H2177    2355.88    307.29
0017                  -------   -------
0018 Cd/Fwd Balances+4244.14+  553.59
0019
0020 Aged analysis to Cash Flow -
   S(C10:C16)■■■■■■■■■■■■■■■■■■■■■■■■■■■
```

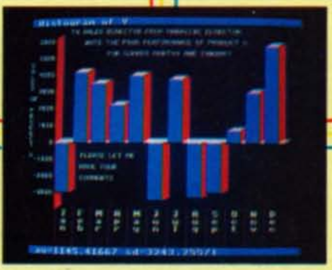


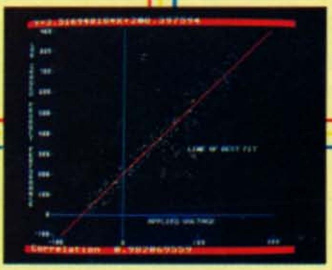
```
C0018     R0001 0020 2000     00 18 13
             DDD-Calc
   A.       B.        C.        D.
0001 --------------------------------------
0002 An   TAB.  Cursor Control
0003 Sc   A.    Column Transfer    es
0004 ou   B.    Blank Cells
0005 --   C.    Close File         -------
0006 Go   D.    Delete Rows
0007 ==   F.    Format Cell
0008 De   G.    Goto Cell          VAT
0009 --   I.    Insert Rows        -------
0010 HB   J.    User Variables     3.07
0011 HB   P.    Printout           3.90
0012 HB   R.    Replicate          4.83
0013 HB   T.    Change Title       3.04
0014 HB   U.    Update Page        4.51
0015 HB   V.    Update File        6.95
0016 HB   W.    Column Widths      7.29
0017      X.    DDD-Base           ----
0018 Cd   Z.    DDD-Plot           3.59
0019      #.    Command Line
0020 Aged analysis to Cash Flow -
 Select option
```



```
A5001     R0001 0020 0085     00 20 16
             DDD-Calc
   A.       B.        C.        D.

!0= 15
!1=ABS((A-B)/2)+S(A1:A546)
!2=TAN(45)+LOG(ATN(164))
!3=FNmax(B12:B200)
!4=FNmin(B12:B200)
!5=A1DIV2*100
!6=-6000*(A2>12)-8000*(A2<13)
!7=
!8=
!9=

!H=DDD-Calc
!P=39
!T=Time
!V=Values

  Edit which: ■
```







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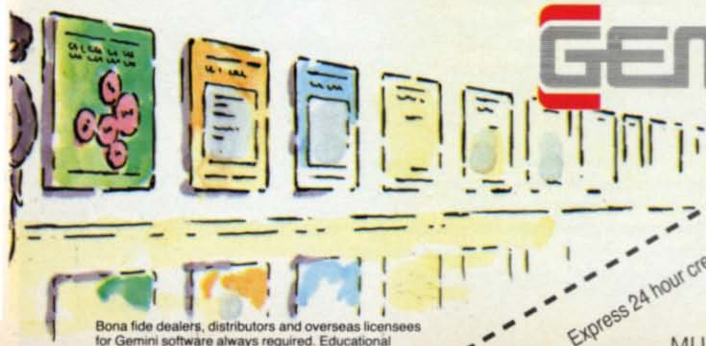
Gemini



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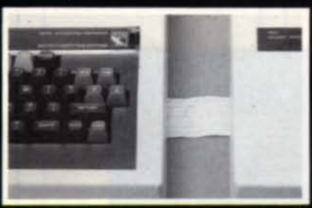
MU

Simply light

ALTRA ENIGMA DISC IMAGER is a very powerful 16K ROM which reaches parts of the disc that no other ROM can.

Enigma gives you 33 more disc commands. Enigma will image any disc, intercept calls to osbyte, read and write deleted data, edit irregular sectors, repair bad tracks, unlock locked tape files, displays the disc ID information, dual formats, transfers tape to disc, disassembles code from the disc, selectively copies files, displays calls made to osbyte, displays calls made to osword.

The above are some of the very powerful commands in Enigma. If you have a BBC disc system the Enigma will prove invaluable. Enigma is 6502 tube compatible.



ALTRA TUBE EDITOR is a new and unrivalled full labelling disassembler and editor ROM for the BBC and the second processor. Some utilities of Altra Tube Editor are append labels to those in memory, disassemble in 6502 and 65CO2 mnemonics, end file overlay, delete given label, delete hex range, delete markers, dump memory, edit memory, overlay files, find strings and bytes, define a hex region, define a label, list memory, load labels, list labels, set memory, calculate and print values, print embedded text in a program after a call, saves ROMS, saves labels. Altra Tube Editor also supports many of the 6502 "Illegal" opcodes.

Altra Tube Editor functions in the BBC as well as in the 6502 second processor.

ALTRA PROBE is a 16K ROM giving you 40 more utilities not available in any other single ROM.

Probe gives you an assembler text formatter, lists a basic programme from file, disassembles, sends screen graphics to printer, memory editor, turns the tube on and off, lists basic variables, moves a program in memory. Altra Probe also contains the complete basic-ed utilities. Altra Probe is an essential utility for all machine code and basic programmes.

Altra Probe is available for use with the 6502 second processor.

ALTRA BASIC-ED is an ideal ROM for the basic programmer giving you the most advanced utilities available. Basic-Ed will list matches, number matches, selective or global replace, bad programme relink, copy a block or line into another position, super pack, relocate, renumber, unpack, tables any line number references by goto's etc., tables every variable, formats listings.

Altra Basic-Ed is available for use with the 6502 second processor.

ALTRA FIRSTAID 1·1 is an economy 8K utility ROM designed for the basic and machine code user. It offers a large number of very useful routines in a simple to use form.

Altra Firstaid 1·1 will disassemble, dump ASCii and Hex, list sideways ROMS, prints the top of the variable table, has a free space calculator, calculates the checksum of any sideways ROM, searches for a string, strips REMS, clears all variables, clears RAM from S400 to S8000, has a machine code monitor, lists the OS calls with their vectors, lists the first 24 control codes.

Altra Firstaid 1·1 is ideal for the beginner and expert.

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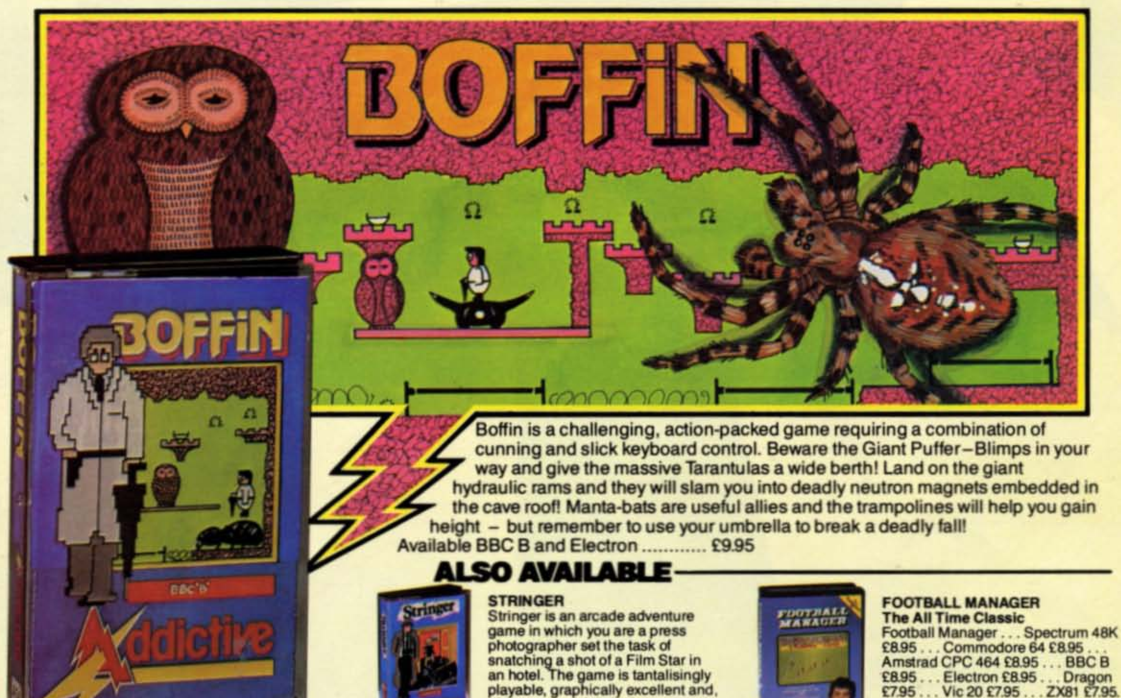
Can YOU avoid the fangs of a deadly spider?

▸ Addictive launch BOFFIN ◂

A Mad Professor on the Loose



Boffin is a challenging, action-packed game requiring a combination of cunning and slick keyboard control. Beware the Giant Puffer–Blimps in your way and give the massive Tarantulas a wide berth! Land on the giant hydraulic rams and they will slam you into deadly neutron magnets embedded in the cave roof! Manta-bats are useful allies and the trampolines will help you gain height – but remember to use your umbrella to break a deadly fall!

Available BBC B and Electron £9.95

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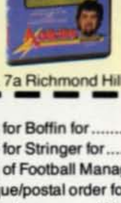

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THE MICRO USER
August 1985
NEWS

Electronic aid to wipe out naughty words

NAUGHTY words of a type that would make even a sergeant major blush are increasingly confronting BBC Micro users who log onto bulletin boards.

All over the UK, systems operators are being forced to devote more and more of their time to erasing electronic graffiti daubed on their boards.

The obscenity problem has been one that to date has baffled the industry. However according to the latest issue of *TeleLink* – a sister publication of *The Micro User* – help may be at hand.

It takes a look at a new Naughty Words Editor which is currently being evaluated by MicroLink, the recently-launched nationwide service for micro users.

The man in charge of the project is 39-year-old Tim Clarkson. He explained to *TeleLink* just how the Naughty Words Editor should work.

"You initially create a text file or glossary of naughty words or phrases", he is quoted, "so when these turn up in any message the whole of the text is pulled out and put in an abeyance file.

"Later the messages are checked over by the sysop to see whether it's safe for them to be released".

That's the theory behind it, but in practice – according to *TeleLink* – it has been presenting more than a few problems.

Worries

The major pitfall is that certain obscenities can crop up quite harmlessly within words.

One of the worries that faces Tim Clarkson is what to do with the species most cherished by birdwatchers, the tit.

"Used in the ornithological context, the word could in no way give offence", he says. "However once it becomes anatomical then eyebrows would understandably be raised.

"So you decide to err on the side of caution and classify 'tit' as a word that might possibly offend.

"What happens then however is that all messages containing the word 'title' suddenly find their way into the abeyance file".

BBC MODEL B MAY BE DISCONTINUED

ACORN has come out with the first public indication that it isn't going to make any more Model B micros and wants to divest itself of secondary interests, including Acornsoft.

The veil of secrecy drawn over Acorn's activities since it severed its relationship with public relations consultants Quentin Bell was briefly lifted when chairman Alex Reid made a live appearance on Micronet 800's Celebrity Chatline.

Alex Reid: revelations about Acorn's plans

The normally tight-lipped Reid, to whom all enquiries from the media are being referred but "who is not making any comments at all" according to his staff, was uncharacteristically forthcoming during the two-hour session.

Responding to a question about public response to the new B+ he said: "They are buying it. And I'm sure they'll buy more when we run out of the basic B model".

Unfortunately the question wasn't followed up, but industry observers are taking Reid's answer to mean that the B has run its course.

The massive inventory of unsold micros that has caused Acorn's recent cash flow problems, leading to the Olivetti "rescue" following disappointing Christmas sales results, was a logical reason for halting the Model B production line.

But chairman Reid's off-the-cuff remark on Micronet was the first official hint from Acorn that the machine is unlikely to be revived, particularly since the B+ is occupying the spotlight.

Reid was similarly open about Acornsoft. It had been generally known that the software firm was available at the right price – rumoured to be in the region of £1 million – but nothing had been said by Acorn until Reid was asked point blank on Micronet: "Why is Acorn selling its most profitable division – Acornsoft?"

His answer: "We are seeking to concentrate on our central activities, and to raise cash to plough back into the company".

Several major software producers are said to be interested in buying Acornsoft. Among them is Firebird, whose spokesman described the suggestion as "extraordinary".

But Firebird is backed by British Telecom and would have little trouble raising the cash for such a purchase.

What makes Acornsoft an attractive proposition, apart from the price it may eventually have to be sold for, is the proven success of its 100 and more titles, its reputation for quality, and an inventory said to be worth nearly £2 million at retail prices.

When *The Micro User* tried to contact Alex Reid about Acorn's plans for Acornsoft and the Model B a member of his staff said: "He is not making any comments at all".

B+ a bargain – Reid

THE BBC B+ is a bargain at £499, says Acorn chairman Alex Reid.

Replying to questions on Micronet 800's Celebrity Chatline, he ruled out the possibility of a price cut to boost sales of the new machine.

"We have to make a decent profit margin", he said. "If you start cutting prices you can destroy yourself by stimulating a price war with other manufacturers".

He added, when asked why the machine had only a 64k memory: "If we had put in more RAM it would have pushed the price up higher.

Upgrade

"If a £500 machine lasts for five years, and you use it for half an hour a day, it costs less than one penny a minute to use – what a bargain".

During the Chatline session Reid refused to discuss plans for new Acorn products, but did offer hope to BBC Micro owners who want to upgrade their machine to a B+.

"We have no present plans to introduce an upgrade kit, but it might come", he said.

He told another caller: "The B+ is an evolutionary step forward. We are working on more radical steps, but they will take time to materialise.

"The home computer market is bigger, tougher and more complicated than it was in 1981".

Five more add-ons for the BBC

FIVE major new releases have been announced by Watford Electronics. Most interest is expected to be created by Watford's Le Modem.

It consists of a 300 and 1200/75 baud fully automatic modem, a 16k ROM, comprehensive manual and free disc software, leads and a mains plug.

Features include auto answer, auto dial and auto baud select.

Watford says Le Modem will transform the BBC Micro into a very powerful worldwide data transfer system with the ability to access all current systems such as MicroLink/Telecom Gold and Prestel, as well as bulletin boards in the USA.

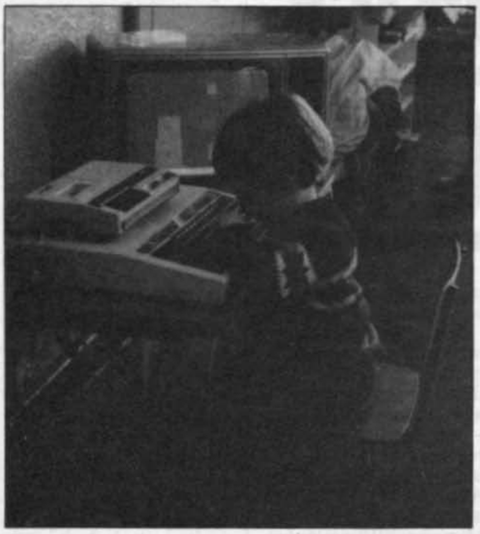
Another new Watford product is the Delta Card, a 6502 processor board which it is claimed will increase the machine's speed by 100 per cent.

There is a sideways ROM/RAM board with the ability to use up to eight standard sideways ROMs. It allows 16k of battery-backed RAM and up to 128k of dynamic sideways RAM.

Spoil-Sport ROM is a product aimed at schools and concerned parents who do not want their computer used only as a games machine but for serious applications.

The ROM contains a "lock" which will prevent machine code games being run without the use of a key – a preprogrammed password.

Last of the five releases is a 16k sideways RAM module designed in such a way more than one can be fitted to the BBC Micro at a time.



They're getting younger every day...

CHILDREN as young as 2½ are learning on a BBC Micro at the Sudbury Hill Montessori School, London.

The school's under-fives have been using the computer for two years, directress Sunanda Ghosh told *The Micro User*.

The programs are all educational, designed by a software specialist to the school's requirements and based on Montessori teaching equipment.

"We have tiny children, under three years old, building a tower on the screen and pairing colours", says Mrs Ghosh.

Confidence

"The older ones do number work, from basic counting to fractions, multiplication and division.

"It is absolutely amazing to see the confidence with which these little people handle a computer".

One of the earliest pieces of equipment used consists of ten graded pink wooden cubes the children build up into a tower.

The aim is to develop the child's visual perception of size and to demonstrate the meaning of the words large, small, larger, smaller, largest and smallest.

The school has three other programs for size discrimination and another for pairing colours. All are based on Montessori apparatus created to refine the children's senses.

As soon as the children can recognise numbers from 0 to 9 they are ready to start on simple maths programs, which are followed progressively by more advanced ones.

"In a Montessori classroom all the equipment is accessible to the children and they decide what they would like to do", says Mrs Ghosh.

"The BBC Micro has its own place and the children use it whenever they wish.

"At first we had to have a queue system as everyone wanted to use it.

"Now they know it is always available, it is used in the same way as all the other equipment".

Now micros can catch a lie

SYNERGY Software has brought out a psychological tool for use with the BBC Micro that could have a profound effect on domestic users.

It functions as a lie-detector to test the truthfulness of excuses for getting home late, can help control the stress induced by being caught fibbing, and can even help overcome phobias – the fear of rolling-pins, for instance.

Biogram is a new concept in computer software and consists of a highly-sensitive stress detector and a suite of control software supplied on disc or cassette.

It operates by measuring the level of stress which is reflected in changes in skin conductivity.

Even a small rise in tension caused by an unpleasant memory will cause a slight change in conductivity which can be detected by the Biogram module and visually displayed on the BBC Micro monitor.

This process is called biofeedback and can help the user control the ability to relax and avoid the unhealthy results of stress and pressures.

The Biogram package also includes two programs designed to detect and help reduce fears and phobias about such things as spiders, confined spaces, heights and mice.

It costs £37.95 in its basic, domestic version, and £47.95 for the model incorporating features designed for educational and research purposes.

Forthdroid

THE benefits of Forth has been extended by Colne Robotics to its Armdroid 1 desktop robot.

It has produced Colneforth, an interactive software package on disc for the BBC Micro and structured in such a way that it approximates a natural language.

The Colneforth disc with manual costs £75.

BIG SHOW PRIZE IS A JOB

A COMPETITION for unemployed youngsters in the North West is to be launched by *The Micro User* with the star prize on offer – a secure job.

Database Publications is to provide full time employment for the winner, who must be an out-of-work school leaver between 16 and 20 years of age.

Although final details of the contest and entry forms will not be available until next month's *Micro User*, it has already been established that participants will need to submit any program they have written, from a simple utility to an exciting game or business package.

The position to be won is that of a trainee programmer with Database Software, a division of Database Publications.

A panel of judges will interview all the finalists before making the appointment during the first day of the Electron and BBC Micro User Show to be held at UMIST, Manchester, from September 27 to 29.

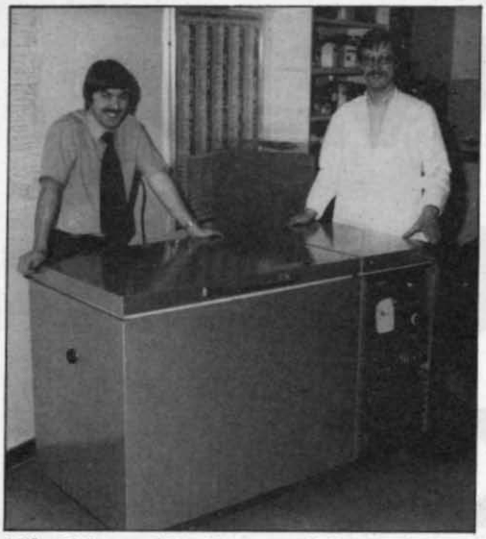
"We want this to be a competition in which youngsters will be able to give full play to their imagination", says Derek Meakin, head of Database.

"It is being designed so that even those with the most limited of computer skills can still participate".

Why a job as a prize? "The North West is a blackspot for unemployed school leavers", says the managing director, "so what could be more attractive to youngsters than the chance of a job?

"And not just an ordinary job either. For the financial rewards in this field can eventually be very large.

"Nor are they likely to find redundancy staring them in the face during their career. This, the field of high technology, is after all where Britain's future undoubtedly lies".



Mike Mahon and Jim Notman with the new freezer

Show encounter aids medical research

A CHANCE encounter at an Electron & BBC Micro User Show last year has led to a major advance in research into crippling diseases at Manchester University Medical School.

The meeting resulted in an exhibitor donating an ultra low temperature freezer worth £4,000 to a specialist team working on muscular dystrophy and related problems.

It all started when two of *The Micro User's* regular reviewers, Jim Notman and Mike Mahon, bumped into Nazir Jessa, boss of Watford Electronics.

At the time Jim and Mike bemoaned the fact that their work at the North West Regional Neuromuscular Unit was suffering from government cutbacks.

In passing, they told the company boss that they were short of a critical piece of equipment – the freezer.

"It was only an off-the-cuff remark", said Notman, "so you can imagine our surprise when Nazir Jessa took us up on it.

"Even though as a qualified optician he obviously has an interest in medical things, we have been overwhelmed by his generosity".

Now that the medical freezer has been installed, it is being used to store human muscle specimens at minus 80 degrees Centigrade.

"This is the critical temperature at which they must be kept for biopsy purposes", said Notman. "As such, the freezer solves a major problem for us".

Breakthrough

Eventually the Manchester research team, which has to rely on grant aid and public donations for funding, hopes to build up a bank of diseased muscle to aid the attempt to make the long awaited breakthrough in the field of muscular dystrophy.

One of the number of projects they have currently underway is a study of Duchenne muscular dystrophy, a wasting disease which only affects small boys.

Such is the severity of the crippling condition that victims usually die in their early 20s.

To analyse the progress of the disease in a quantitive way through muscle tissue specimens, BBC Micros are used.

"The machine, with its fast processing power, graphics and versatile interfacing, has a tremendous part to play in this area of research", says Notman.

"And thanks to the generosity of people like Nazir Jessa, we will be able to push ahead even though our grants subsidy has been cut.

"It was our lucky day when we decided to go to that show".

Micro war hots up behind the Iron Curtain

THE next home computer war is likely to be fought behind the Iron Curtain, with the BBC Micro taking on Commodore and Sinclair machines in a bid to corner the education market in the Soviet Union.

China and India are also seen as juicy targets for the three companies anxious to off-load bulging inventories.

Acorn in particular, lurching from one cash flow crisis to another, needs to drastically slim down its micro stocks.

There are two factors in Acorn's favour. Firstly the policy of computerisation of Soviet classrooms has been endorsed by the country's leader Mikhail Gorbachev.

Secondly Acorn made the first breakthrough earlier this year with a 20-station BBC Micro network for the Moscow Education Institute.

The £20,000 order was reward for the marketing initiatives of Acorn and distributor 3SL Overseas, who jointly developed a version of the BBC Micro with Cyrillic as well as Roman characters.

Soviet education authorities are due to announce this month the preferred educational computers for a number of official test sites. Acorn expects the BBC Micro will be one of them.

Another market which could open up shortly to absorb some of the present glut of micros is India, where prime minister Rajiv Gandhi is said to be in favour of reducing import tariffs on high tech products.

The Indians are believed to be interested in deals involving part finished computers, thus allowing their own workers to develop new skills as they assemble the machines.

China's commitment to increased trade with the West includes a four part high technology strategy for the country's modernisation.

The Chinese recently signed a deal to import micros and peripherals from Apple and their ministry of education says it is anxious to develop ideas and concepts for the use of micros in schools and colleges – a field where Acorn has unrivalled expertise.

Enter the £64 disc drive

IN a move that is likely to have dire consequences for the cassette player market, Northern Computers has launched a £64 disc drive for the BBC Micro.

At the same time, the company has announced price reductions across the entire range of its Micropulse drives.

"A cassette player that costs £30 isn't worth considering when compared with a £64 disc drive", insists Gareth Littler, a director of Frodsham-based Northern Computers.

"There can be little future for cassettes after this".

The impact of the £64 disc drive will not be restricted to cassettes, however, he predicts.

"I'm sure this will also have a tremendous effect on all disc drive manufacturers", he says.

"There is bound to be a real knock-on effect as people bring their prices down in order to compete".

LincTel SOS

A CRY for help has come from Michael Alger, assistant head of the John Birkbeck High School at North Somercotes, Louth, Lincolnshire, whose Prestel-type viewdata service was featured in the July issue of *The Micro User*.

The number given for access to the LincTel database was that of the school's main office, which has been inundated by calls from readers of *The Micro User* trying to log on.

Says Michael: "Would you please print an amended number, which is 0507 85404, before my secretary hands in her resignation as her response to whistles down the phone all the time".

A few well chosen words

about the new SPEECH ROM for the BBC micro

SPEECH ROM
THE SPEECH ROM FOR THE BBC MICRO!
Computer Concepts

The normal ACORN speech system allows the computer to speak a hundred or so pre-determined words. This is fine if you only want the computer to speak these words, but in practice it is extremely limiting.

Spoken English is actually made up of a few dozen basic sounds known as phonemes. Any word can be formed by putting the correct phonemes together, and this is the basis for THE SPEECH ROM. The user can specify a string of phonemes so creating whatever words or sentences are required. The ROM is controlled by simple "★" star commands and so can be used from BASIC and most other language ROMs.

A unique feature of this package enables the pitch and the emphasis of words or parts of words to be changed. Because this is not normally possible, computer speech tends to have no expression. THE SPEECH ROM can emphasise a particular syllable and so re-enforce the meaning of a sentence. This feature also enables the computer to ask questions in a more realistic manner.

Another novel feature is that the ROM includes a singing feature, the user simply specifies the phoneme and the note.

No soldering required.

This ROM requires the speech processor to be fitted into the machine. If your machine has the ACORN speech system fitted then the processor chip will be there already. If you do not have the ACORN speech system then we can supply the processor chip for £10.00 incl. VAT. This chip simply plugs in like a ROM and requires no soldering.

THE SPEECH ROM FOR THE BBC MICRO!
SPEECH

When operating, the speech ROM requires 2 pages of workspace. This means that PAGE is set higher in BASIC. When not in use no memory is used.

Both the SPEECH ROM and the SPEECH PROCESSOR are simple plug in chips that require no soldering. Full fitting instructions are supplied with both chips.

Please state clearly when ordering if you require the SPEECH PROCESSOR with the SPEECH ROM.

Available from all good BBC dealers or directly from ourselves at the address below.

£28.00 + £1.00 p&p + VAT (£33.35)

Computer Concepts

Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX (0442) 63933

Access

VISA

B+ is rapped on price

THE BBC Micro remains a superb machine with facilities which will keep it vital for several years yet.

The second processors and other enhancements such as teletext, IEEE, instrumentation and music synthesis have kept it abreast of the state of the art.

This is the view of reviewer Roger Cullis in the respected journal Practical Computing. But what inspired Cullis to wax lyrical about a four-year-old machine last month wasn't a time warp but the arrival of the BBC B+.

Like other reviewers, Cullis gave Acorn's latest product a lukewarm welcome, awarding it a B+ for compatibility and potential but C– for timing and price.

He said Acorn should have concentrated its resources on the computer itself and left the add-ons to third party suppliers.

"The B+ is two years late, yet it still bears indications, such as the outmoded DFS software, that it was released in a hurry", he said.

"The question is, at a price just short of £500 for some not very new technology, does it stand a chance"?

ECONET GETS ITS LOGO

LOGO Software has issued a version of its Logo for the BBC Micro for Econet systems.

It is fully compatible with Econet 3.6 and the 6502 second processor. Econet 3.34 systems require the upgrade to 3.6, available from Acorn Computers. It requires 16k of sideways RAM per machine.

The licence fee per network is £40, plus £15 per manual supplied. The minimum package is LSL Logo on disc, plus four manuals, at a price of £100.

DOING WELL IN SCOTLAND

ACORN, despite its problems south of the border, has been making substantial gains in the Scottish micro market.

Such has been its success that it expects to break through the £1 million sales barrier there this year.

Yet Acorn's presence in the Highlands and Lowlands is virtually a one-man operation.

That man is Ian Goodall, a squash-playing, real-ale-drinking West Coast Scot from the island of Isla.

As sales manager representing all Acorn's divisions north of the border, his territory makes up one-third of the UK.

"So you can see why I expect to drive 40,000 miles in a year", he told *The Micro User*.

However his hours spent on the road are obviously paying off. Since he took over the job in April, 1984, he has doubled Acorn's sales.

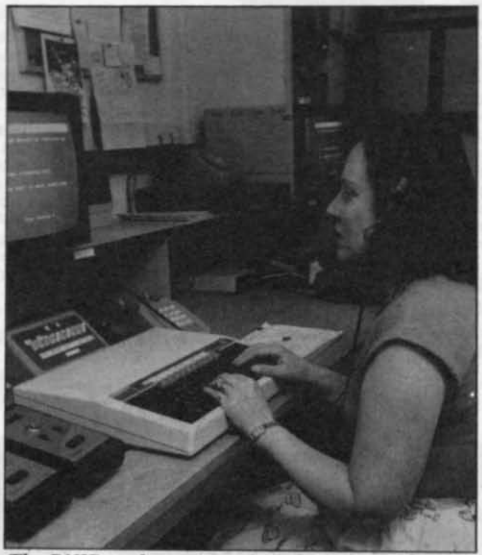
To achieve this, he has built up a dealer base that now covers all the key outlets in both the educational and retail sectors.

It is in the education sector, however, that Ian Goodall has made substantial inroads in recent times. As a result, Acorn is now challenging Sinclair in its former stronghold of the Grampian and Central Region.

"We have been helped in Scotland by the increasingly enlightened approach to computer education up there", he admits.

"Scotland leads the way in Comal, which is now an approved language for the Scottish "O" Level in computer science.

"And that same syllabus requires students to have experience on the Acornsoft Aviator simulator. So you can see the authorities are truly Acorn-minded".



The RNID exchange in action

New programs for old, offer

BBC Micro users buying programs from new software house Pineapple will never have to buy a new version, the company claims.

It is offering a deal to customers where if an "original" is returned they will receive an updated version of the program free.

Pineapple has released two disc based programs for the micro called Diagram and Basic Compiler.

It claims Diagram is the only CAD program available for the BBC Micro which allows the user not only to draw, store and print very large diagrams, but to view or edit any part of them by scrolling the screen around.

The Basic Compiler is designed to let the user write programs in Basic which can then be compiled into extremely fast "optimised" machine code.

Both cost £25 and come complete with instruction manuals.

MICRO PHONE EXCHANGE LETS THE DEAF 'HEAR'

A NEW telephone service developed by the Royal National Institute for the Deaf is about to transform communications for the non hearing.

The RNID has launched a BBC Micro-operated "talking and listening" exchange. It enables communications between a deaf person, with computer and modem, and an ordinary telephone user.

Mrs Stella Home, the telephone exchange supervisor, explained the system. When a deaf person dials the RNID operator they are put through to the hearing person as normal.

Their reply is received by the operator who types it onto the micro and sends it down the telephone line to the deaf person's computer. The message can then be read from the monitor.

A deaf person whose speech is difficult to understand can send messages in the same fashion via the computer terminal and exchange. They are read out to the "hearer" by the operator.

The exchange is able to connect calls over the whole country but as they have to be routed through it, charges increase according to distance from London.

Unfortunately British Telecom is against providing subsidy for the disabled, so users may find it a costly, although worthwhile, exercise at peak times.

For further details write to the RNID, 105 Gower Street, London, WC1E 6AH. Messages may also be left on the RNID Telecom Gold Mailbox.

● The Institute has developed a special terminal software package for their BBC Micros.

It makes full use of Mode 7 colours and graphics to communicate with the deaf and also guides the operator on setting up calls and controlling the telephone line-switching equipment.

PACKAGE FOR THE TRADERS'

TRADESMEN who need help with costing time and materials can now look to Micro Component Trading for help.

MCT has released an estimating package on disc for the BBC Micro, price £19.75.

The package can be used to prepare price lists and estimates, place them in separate directories, and produce them when required.

It also provides three types of information presentation and, if absolute security is needed, can exclude calculations from the final presentation, says MCT.

The package's minimum specification is two 40-track single-sided disc drives.

A GREAT PACKAGE DEAL!

For serious users of the BBC Computer.

A professional trio which can be integrated to produce an information management system of exceptional power.

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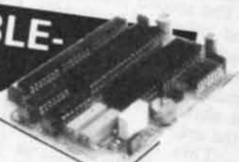

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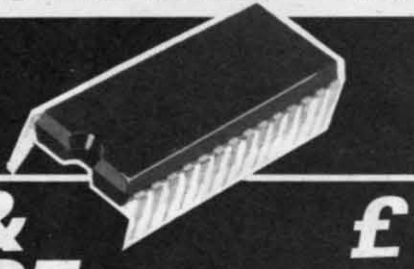

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Breaking barriers between art and science

JEREMY Gardiner is a talented young painter with a mission. He wants to make "computer art" respectable. Like most people in the "real" art world he's appalled by the kind of random designs beloved by computer programmers that look "like the pin-and-string patterns found in craft shops".

But don't get the idea that Jeremy Gardiner knocks computers.

Far from it, all his latest and best work would not have been accomplished without the aid of computers in general and a BBC Micro in particular.

Gardiner worked with computer graphics at the Royal College of Art and at Middlesex Polytechnic before being sponsored by GEC to produce a number of computer-inspired works.

Whirling

These were based on computer designs manipulated using Picaso – the picture algorithm subroutine orientated 3-D animated software used by graphic artists to produce the whirling images often seen on TV – and a special program written on a BBC Micro.

Gardiner input a shape via a drawing tablet, then entered a second shape.

The computer then constructed a series of "in between" images, gradually changing from the first to the second shape.

The original shapes came from GEC's archives "and from waste-paper bins at the research centre".

Attacked

Having processed the material through Middlesex Poly's computer using the BBC software, Gardiner chose the shapes he liked best, printed them out in hard copy form, put the acetates on the floor "and attacked them with a pair of scissors".

After mentally melding the designs, he applied several types of paint – including lead, industrial graphite and acrylics – on to canvas with a variety of instruments including an icing syringe.

The result is a vividly original series of paintings that have won 27-year-old Gardiner acclaim on both sides of the Atlantic.

Says Gardiner: "I'm trying to avoid stigma by still using traditional materials, but using technology to help evolve the concept.

"The problem is that computers have been the domain of scientists and programmers – that's why most computer art is crass.

"But things are changing and artists are getting the opportunity to work with programmers. Hopefully this will break down some of the barriers between art and science".

Miniature Jeremy Gardiner against a background of one of his computer-inspired designs

Drives bridge the gap

A CLAIM to have "bridged the gap" between micro and monitor, giving twin disc power to the BBC Micro, comes from Broadway Electronics.

The Broadway Disc Bridge features advanced cable management, replacing the familiar cat's cradle of trailing wires with a business work-station look.

It features twin 400k Mitsubishi slim-line drives, which are both switchable from 40 to 80-track by front-mounted push-buttons with status-indicator LEDs.

The fully regulated 4 amp in-board power supply has full overload shutdown to protect the drives.

A feature is the 6 amp mains input filter providing a "clean" power supply. Filtered mains current is also supplied to three take-off sockets at the rear of the unit, which power the computer, monitor and printer.

Complete with twin drives, it retails at £399.

Disc Bridge in action

Special service for handicapped

A SOFTWARE house has been set up to serve exclusively the specialist needs of severely mentally handicapped children.

Called Specialsoft, the firm says its software, for the BBC Micro, is designed by specialist teachers Robert Thomas and Andrew Wallwork and was rigorously tested for 18 months on children of all ages.

Its initial launch includes Specialsum, Specialsort and Specialmatch, the latter two having eight individual programs. The disc versions cost £11.90, cassettes £10.90.

Said the two teachers: "The computer is not a universal remedy for the problems that these children face, but it provides another way that they can achieve significant results with an electronic tutor that has infinite reserves of patience".

However, Specialsoft products are only intended to supplement the teaching, not to replace the teachers, they said.

Licence plan for network

MICROSCENE is considering licensing its new Link-Up network for the BBC Micro to a national software distributor or manufacturer.

The company says the network can be used in education to facilitate computer aided learning, in commerce and industry for data transfer, interdepartmental instruction and stock control, and in medicine for transfer of patients' files.

Link-Up, price £99, is a one-way network based on the RS423 and allows the user to send programs to any number of listening slaves. Only the master, which is not dedicated, needs to have a disc file system.

It can transfer machine code and Basic and will cope with any line lengths. There is a facility to take control of each slave and issue commands from the master.

The software is in machine code making it virtually impossible to crash or overwrite it and Escape and Break are both supported.

Comal on ROM for BBC

THE educational microcomputer language Comal is now available for the BBC Micro in a ROM-based version from Acornsoft.

A language which draws on features of both BBC Basic and Pascal, it has already been chosen by a number of European countries as their official language for secondary school use – and the USA is also proving an enthusiastic market, says the company.

Its features include drawing attention to syntax errors as lines are entered, checking structure before a program is run, supporting reals, strings and multi-dimensional arrays, simplifying file I/O, and providing parameter passing facilities for procedures and functions.

Comal comes on a 16k ROM and includes a 440-page user guide.

Price: £49.85.

Euro software

COVENTRY Polytechnic has introduced a continental flavour to its computer assisted language learning software for the BBC Micro.

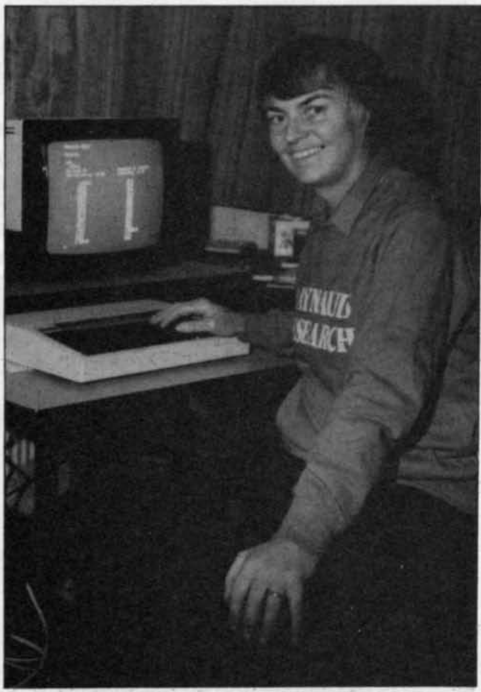
Its Unitext program allows teachers to create text files in English, French, German or Spanish with full range of accents and special characters.

The program has word processing capabilities so text can be entered, formatted, edited and printed out. It can then be used with accompanying student programs, Unitest, Unigap and Unisub which are text reconstruction, gap filling and substitution exercises.

A similar Rustext series has also been produced which permits the use of Russian and Roman characters together.

Both menu-driven series can be used with standard disc machines fitted with the Acorn DFS or Econet level 1 network, Symbnet and Enet.

A helping hand from BBC Micro



Anne Mawdsley . . . search for information

A BBC Micro is extending a helping hand across an ocean of hopelessness to many thousands of sufferers of the disabling Raynaud's disease.

The computer is proving the linchpin of a worldwide self-help association started in 1982 by Anne Mawdsley.

Raynaud's disease is named after Maurice Raynaud, who in 1862 published a thesis on "gangrene and intermittent asphyxia of the extremities".

A change in temperature, or of emotion, can trigger an attack.

Anne, a teacher, discovered she had the disease in 1975 and she had an operation.

A desperate search for a cure, or relief, from the increasingly painful, frostbite-like effect of Raynaud's followed.

It unearthed one major fact – information was not readily available to sufferers and no-one seemed willing or able to start providing it.

When Anne appeared on a TV medical programme to discuss her relentless, and often fruitless search, hundreds of sufferers responded.

Since its formation, the Raynaud's Association has built up a 2,000-strong worldwide membership. All receive the quarterly newsletter and regular information pamphlets.

Anne realised she could not cope with the work involved alone – filing, typing, writing and other such tasks aggravated her condition – so she appealed to computer firms for help.

They responded.

Acorn provided the all-important BBC Model B Micro, ICL the software and disc drive, Microvitec a monitor, and Epson a printer.

Using them, it was easy to build and update data and mail bases, to compose and edit newsletters, books, letters of appeal, forms, committee agenda and minutes, and to mass-produce them and address envelopes.

Said Anne: "What at first appeared to be a daunting task began to be a most interesting and challenging project".

REVIEW STARTS MAILBOX BATTLE

MODEMS have been on overtime during a heated row between BBC Micro software publisher Kosmos and Micronet 800 that has been entertaining telecomputing enthusiasts in recent weeks.

What started as an argument about qualifications of educational software reviewers has spilled over into areas such as the standards of electronic journalism and the merits of multiple choice versus traditional methods of testing knowledge levels.

The dispute began when Micronet ran a review by T.D. Brovnik of the Kosmos geography quiz program "Identify Europe".

Brovnik's assessment included the comments "unimaginative" and "ineffective" and concluded: "But for its high resolution colour display, this program could have been written 15 years ago".

Kosmos boss Keith Spence was incensed by the review and complained to Micronet about "imbecilic ramblings of an individual obviously totally unqualified to judge the merits of educational software".

Spence said the review was "an insult to myself, my company, the author, and the educationalists involved in the program's formulation and design.

Egotism

"Educational software reviews must be carried out by a responsible educationalist – not by someone whose capacities do not extend beyond steering colourful blobs around games software screens", he said.

"The reviewer, while wallowing in his egotism, has even had the audacity to challenge the multiple choice answers technique and to suggest we were not capable of writing software incorporating direct response analysis.

"It is hard to believe your reviewer could publicly admit to such a fundamental ignorance of modern teaching and testing techniques".

Micronet responded by publishing Spence's views on the network along with the statement: "Our reviewer has been a lecturer in computer science for the past five years, and worked for three years at the Council for Educational Technology as a researcher in computer aided learning".

But Jeff Hughes of Liverpool SPS Advisory Centre mailboxed: "It seems that we continue to suffer the presumption that those who teach computer studies are experts in educational computing.

"The record of CET is nothing to write home about, most advances being made in spite of their influence rather than otherwise".

Barbara Conway of Starlight came to Micronet's defence with: ". . . a small bouquet over the way you reacted to the Kosmos attempt to force you to change an adverse review of one of their programs".

NEW SOLID GOLD Software

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Ogg the caveman has just found some new transport...Kickstart the turtle. Help Ogg ride Kickstart, avoiding snakes, pterodactyls, logs, toad-stools, dinosaurs etc. Continuous scrolling multi screen action. 60 levels. Excellent graphics.

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Theodore, a daring athletic young chap, is lost down the sewers. As well as fireballs and slippery floors, all kinds of horrible beasties are on the prowl. Head-butting them from below will kill them but beware...No one has yet escaped.: Will you be first? A totally addictive multi-screen game. Superb Music Score.

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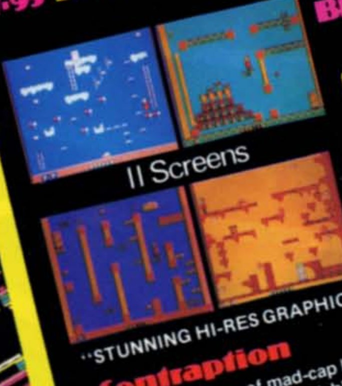

II Screens

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ROM-LINK

NEW CONCEPTS

INTER SHEET
THE ELECTRONIC SPREADSHEET ROMS

Spreadsheet programs have become one of the most popular micro-computer applications in recent years. They can be thought of as a totally general purpose numeric tool, of use to anyone who has to handle figures, calculate costings, keep control of running costs, or just simple budgeting.

This package contains the ROMs, a quick reference card, an introductory manual to spreadsheets and a comprehensive reference manual. Chip fitting instructions and a function key strip are also included.

The program has many quite unique features.

1 40, 80 or 105 column screen display. The special 105 character screen mode displays more than any other spreadsheet.

2 Up to 16 spreadsheets may be stored in memory at once.

3 Data can be transferred from one spreadsheet to another.

4 Spreadsheet data can be transferred to and from popular wordprocessors such as WORDWISE and VIEW.

5 This package will integrate directly with other ROM-LINK compatible products, such as INTER-CHART, which can produce charts and graphs of data from the sheet.

6 Formulae in boxes are tokenised to save space. This means larger than normal spreadsheets can be accommodated.

7 Main menu enables even the inexperienced user to operate the more complex functions. There is no need to remember long command names.

8 Extensive built-in help menus

These are in addition to many other powerful features such as: Variable column widths. Flexible replication facilities. Insert and delete rows and columns. Numbers may be printed in three formats. The number of decimal places is variable from 0 (integer) to 9. Locking/unlocking of boxes. Boxes may be justified left or right for numbers and left, centre or right for labels.

Most of the above features can affect individual boxes, rows, columns or the entire sheet.

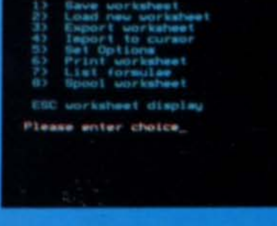
INTER-SHEET supports a large range of high precision mathematical functions. These include all the more common functions such as SIN, SQR, TAN etc. but also include special sheet functions like SUM, MAX, MIN, LOOKUP, AVERAGE.

A special form of windowing has been included allowing any row or column to be held on screen as the sheet scrolls underneath.

All in all these features go to make INTER-SHEET the most powerful and flexible ROM based spreadsheet available for the BBC Micro-computer.

£48 + £1 p&p + VAT (£56.35)

ROM
INTER-
SHEET
SHEET
INTER-SHEET
Computer Concepts



```
INTER-SHE  0
(C) Computer Con  pts 1985

1)  Save worksheet
2)  Load new worksheet
3)  Export worksheet
4)  Import to cursor
5)  Set Options
6)  Print worksheet
7)  List formulae
8)  Spool worksheet

ESC worksheet display

Please enter choice_
```

ROM LINK

This is a new system devised especially to take advantage of the BBC Micro's unique ROM handling capabilities. A series of application ROMs will be produced that can, when used together, form a truly integrated suite of programs.

The packages can, of course, be used on their own and do not require other ROM-LINK packages to be installed.

The ROM-LINK system offers two great advantages. Firstly it allows up to 16 separate programs to have data in memory at any one time. This could be data from any ROM-LINK compatible program, and so eventually it will be possible to have, for example, a couple of documents being word-processed, a few spreadsheets, and a set of data for plotting graphs.

INROM SOFTWARE

INTER-CHART

THE CHART & GRAPH PLOTTING ROM

This ROM-LINK compatible program allows practically any data to be presented in graphic form.

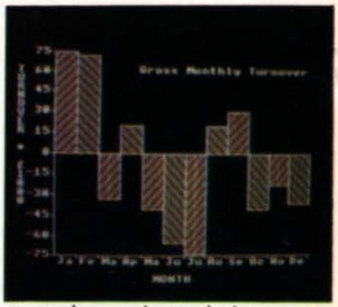
Rows of figures are always difficult to digest, but when displayed as graphs even the most complex data becomes understandable. This program will cope with just about any sort of numerical data. At its simplest level a string of numbers can be entered at the keyboard, and a graph will be plotted.

Because this is a ROM-LINK compatible product it can read data from any other ROM-LINK program. It is especially tailored to INTER-SHEET and so can very easily use spreadsheet data for plotting charts and graphs.

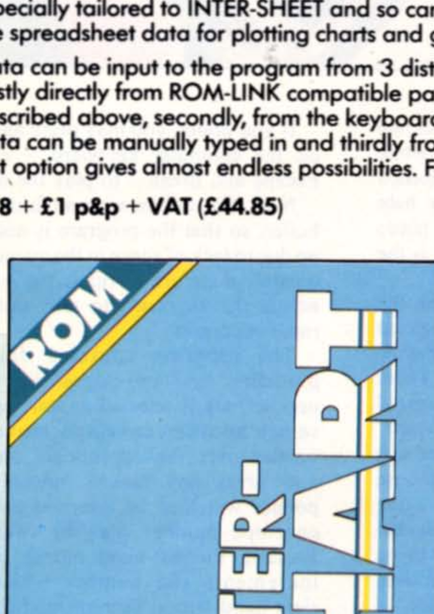
Data can be input to the program from 3 distinct sources. Firstly directly from ROM-LINK compatible packages as described above, secondly, from the keyboard so that data can be manually typed in and thirdly from file. This last option gives almost endless possibilities. For example a BASIC program could save the data or it could come from a word processed document.

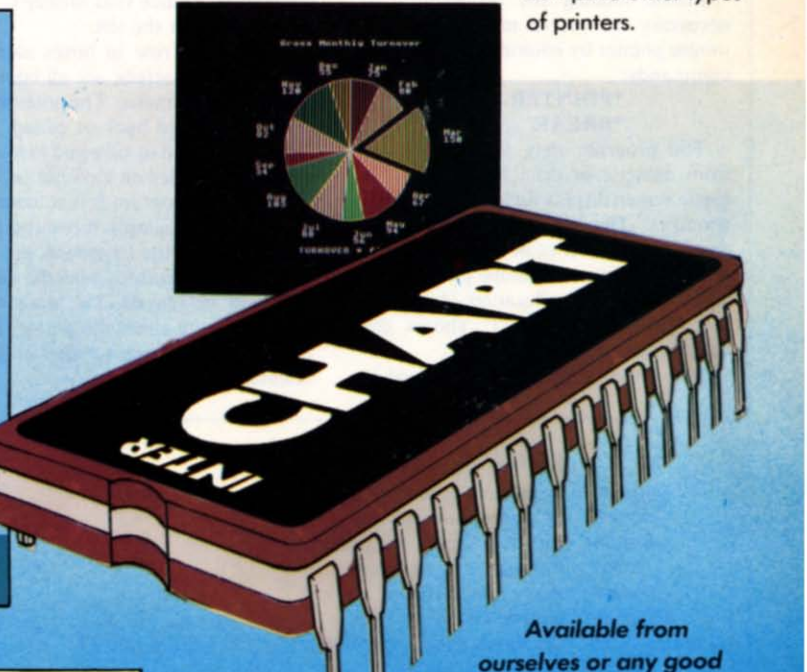
£38 + £1 p&p + VAT (£44.85)

Three basic types of graph are supported—the pie chart, bar graph and line graph. Once data has been entered into the program it can be displayed in any of these formats. Multiple sets of data can be combined onto one graph for comparison.



This program supports a full range of mathematical functions, and allows data to include complex mathematical or scientific expressions. Because it is completely auto-scaling there is no need to worry about how many numbers are entered, nor about their range. Routines are included for dumping the graphs to EPSON compatible printers, and provision is made to allow dumps to other types of printers.


ROM
INTER-CHART
The chart and graph plotting program for the BBC Microcomputer
Computer Concepts



With only one ROM-LINK compatible ROM in the machine then up to 16 sets of data can be held for this ROM. It is a simple matter to switch between sets of data or completely different ROM-LINK programs, and all the data remains in memory intact.

The second advantage leads naturally on from the above. It is possible to transfer data from any ROM-LINK package to any other. If only INTER-SHEET is present in the machine, it is possible to transfer data between separate worksheets. If more than one ROM-LINK package is present then data can be transferred between any of these. This data transfer is direct in memory, and does not require the saving of data to disc.

The first two ROM-LINK compatible packages are INTER-SHEET and INTER-CHART. It is hoped that others will be available later in the year.

Available from ourselves or any good BBC micro software dealer.

Computer Concepts

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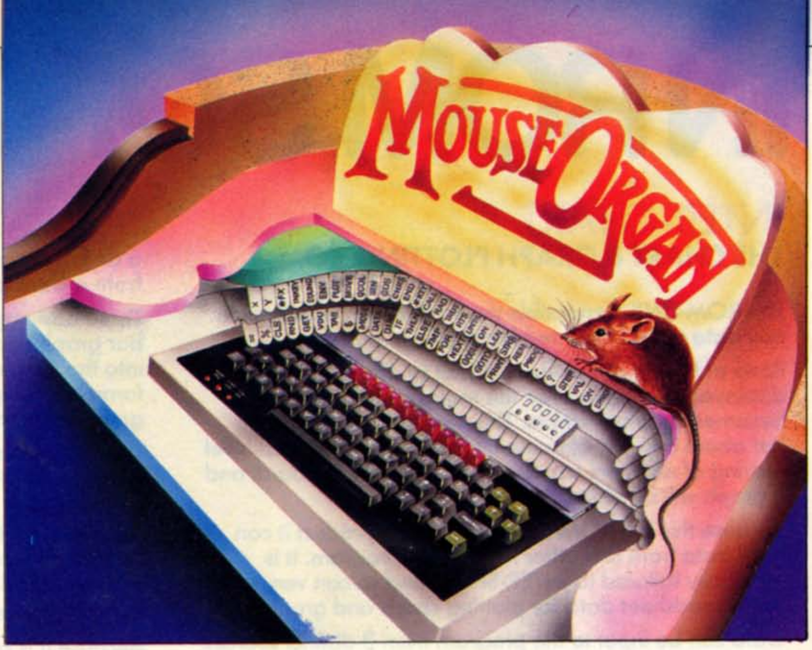
Telephone: Hemel Hempstead (0442) 63933



THERE are two basic problems associated with using a computer to play music. The keyboard itself is not really suitable as an instrumental keyboard, and the range of notes playable usually has to be limited to about two octaves.

This utility written for the BBC Micro and AMX Mouse overcomes both problems. The program displays a 64 note keyboard, including sharps and flats, which covers more than five octaves, and includes every note available on the BBC.

Also the use of the mouse pointer and buttons eliminates the need to use the computer keyboard to play the notes.

With a little practice it becomes very easy to play simple tunes with the mouse.

The program also incorporates an envelope definer which allows envelopes to be changed rapidly and easily. The newly defined envelope can then be played on the keyboard.

Before loading the program, it is necessary to reserve memory for the mouse pointer by entering the following commands:

```
*POINTER ON
*BREAK
```

The program may then be loaded from cassette or disc. It consists of a single screen display divided into several windows. The top half of the screen displays a number of boxes showing the currently selected envelope parameters, and also the note duration. A further box, labelled EFFECT, shows the selected sound effect.

The actual keyboard is displayed in the lower half of the screen. It is shown as a normal piano keyboard, with white and black notes. The keys are labelled BCDEF and so on, which may help those who are unfamiliar with piano keyboards. Notice that middle C is the second C from the left.

Finally, the row of boxes along the bottom of the screen are all connected with recording music. The notes may be recorded, played back or edited. There is also an option to save and load stored notes in datafiles on cassette or disc.

When the program is first loaded it is in play mode. Simply move the mouse pointer across the keyboard, press one of the mouse buttons and the selected note will be played. The note will be sustained until either the pointer moves over another note or the button is released.

If you prefer, you may press any key on the computer keyboard – except Escape and Break – to play the notes.

Note that each new sound flushes the buffer, so that the program is not held up due to lack of space in the queue. It is possible therefore to ripple the pointer across the keyboard to play notes in rapid succession.

The program contains data to predefine four envelopes. Envelope number one is selected at start up. To select another envelope move the pointer over the appropriate number and press any mouse button. The pointer will then be removed and the envelope number may be changed. Pressing the left-hand mouse button increments the number while the right-hand button decrements it.

Having reached the desired number,

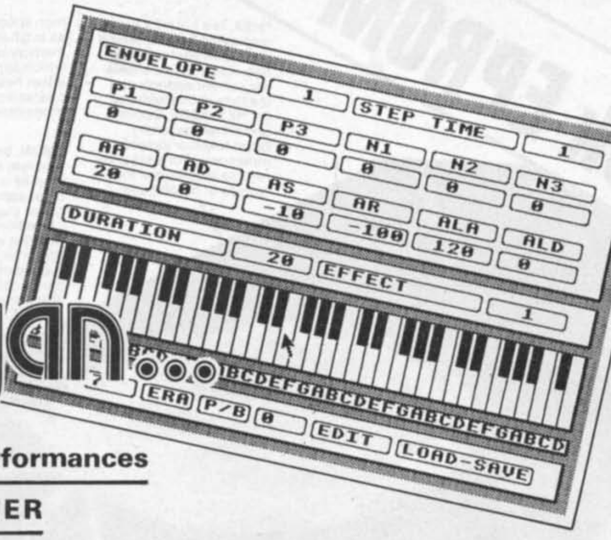
PROCEDURES

initialise	Initialises variables.
screen	Sets up screen display.
button	Identifies function required.
icons	Prints parameter boxes.
music	Plays selected notes.
envelope	Defines envelopes.
parameters	Displays envelope parameters.
change	Selects new envelope.
step	Changes step value.
pitchamp	Changes pitch or amplitude parameters.
sounds	Displays duration and effect.
duration	Changes duration.
effects	Changes effects parameter.
memory	Selects memory function.
record	Selects record mode.
Lplay	Selects playback mode.
erase	Erases stored notes.
edit	Selects edit mode.
load	Loads datafile.
save	Saves datafile.
wipe	Edit-Erase function.
wipeone	Erases one note.
wipeend	Erases notes to end.

VARIABLES

E%	Envelope number.
D%	Duration.
F%	Effect number.
P%(I,J)	Envelope parameters.
P$(I)	Parameter titles.
min(I)	Minimum parameter values.
max(I)	Maximum parameter values.
N%	Note.
R%	Record flag.
note%	Number of notes recorded.
edit%	Note being edited.
ed%	Editing flag.
wp%	Erasing flag.

Play the mouse organ



Let the AMX Mouse conduct your performances in this musical utility by GEOFF TURNER

press the centre button and the new envelope will be selected with all the parameters displayed.

Note that when pressing the left or right buttons the selected number rotates from minimum to maximum and vice versa – that is the next number after four will be one.

The same method is used to alter any one of the envelope parameters. Remember to place the pointer over the displayed parameter and not its title box.

The duration of the sound can be altered by changing the value in the DURATION box – same method as above. However the actual duration of the note will depend on various other parameters. For example, envelope two has a fast attack and decay period and the note will have finished well before the duration is ended.

The effect parameter allows various sound effects to be created by playing more than one envelope at once on several channels.

There are three effects. Number one simply plays the currently selected envelope by itself. Effect two plays envelopes one and two together, while number three plays envelopes one, two and three together. Carefully selected envelopes can produce interesting harmonious, or unharmonious, results.

The program allows up to 999 notes to be recorded and played back. To select record mode move the pointer over REC and press any key. Record mode is now selected and any notes played will be stored. A counter indicates how many have been recorded.

To play back the stored notes select P/B and press the left-hand mouse button or any keyboard key. Each note will be played in turn whenever a key is pressed, with a counter showing the number of each note.

It is necessary to press the keys at the right tempo to make the tune sound correct, but with a little practice this becomes fairly easy.

When the last note is played the program automatically leaves the playback mode ready for more playing or recording.

If you wish to leave the playback mode before reaching the end press the centre mouse button.

Editing is a little more tricky. Assuming you have recorded and played back a tune, and realised that one note has been entered incorrectly, entering edit mode allows a single note to be changed or erased.

Select edit mode by moving over the EDIT box and pressing a key. Now pressing the left-hand mouse button allows you to step forward through the tune similarly to the playback mode. Pressing the right-hand button steps backwards through the notes. In this way it is possible to move forward or backwards until the incorrect note is located.

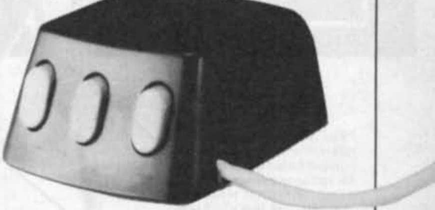
If a large number of notes have been entered, move backwards through zero to reach the later notes rather than stepping forward through all the notes.

Having reached the wrong note, press the centre mouse button. The pointer is now restored, and the new note can be selected and played. The edit function locks on to this note, and the new note may be entered any number of times until the correct one is found.

Now de-select edit mode by moving over the edit box and pressing the centre mouse button again.

If you wish to erase a note, after reaching the required note with the edit function select the erase box ERA. The program will now ask if you wish to erase a single note, or all notes from the current one to the end.

The erase function can be selected at any time if you wish to erase the tune completely.



Having recorded your masterpiece you may save it to disc or cassette by selecting the SAVE box. The program will then prompt you for a filename before saving the data.

Similarly a file may be retrieved from disc or cassette by selecting the load option and entering the filename.

Incorrect filenames are trapped in the error handling routine, and the program prompts you to re-enter the correct name.

AMX Mouse Offer

Save up to £20 on normal prices by using the order form on Page 175.

Full listing starts on Page 132

16k EPROM

***HEX,** Is a full HEX dump, displaying 8 bytes of HEX and ASCII equivalent per line. A status line shows the current address and the byte at this address in:- HEX, ASCII, Decimal and either the binary, basic token or assembler mnemonic. Forward and reverse scrolling of the display at normal and high speeds is a feature, as is a full on screen memory editing facility which allows inputs in either hexadecimal, ASCII characters or assembler mnemonics.

***MON,** Serves the same function as *HEX, but the display is in disassembled opcodes, rather than *HEX. The editing and scrolling facilties are the same as for *HEX. An additional feature of *MON is the ability to directly follow JSR's, branch's etc.

***DEBUG,** A full featured program debugging aid, allowing the programmer to see the most intimate details of the program under examination. Features, variable speed, single stepping, breakpoints, continuously updated disassembler, selective HEX dumps (up to 6) plus current stack, all continuously displayed on screen, plus many other features.

***DISCED,** A comprehensive disc sector editor enabling any sector of a disc to be read, inspected, edited and written back. It will work with any 40, 80 or dual formatted single density disc.

***DGET,** Searches a disc for all occurances of a string or group of bytes.

***REL,** Enables machine code to be easily moved around in memory, automatically adjusting JSR's, JMP's etc.

***SLOW,** This command causes the entire computer to slow down to any variable speed between 1 and 255. This can allow the in depth study of graphic's methods etc.

***EDIT,** A dynamic basic screen editor, cursor controlled with full forward/reverse scrolling of listing, incorporating insert/delete lines, insert/overwrite characters, enter line from any position after editing.

"No need to Sweat!
Let me be your slave."
"The Slave Drivers Guide."

***REF,** Produces a cross-reference listing of the current basic program. All variable names are listed (WITHOUT HAVING TO RUN THE PROGRAM!) in alphabetical order followed by the line numbers on which they are referenced. Numeric items can also be crossed referenced if desired.

***SORT,** A built in sort routine allowing any single dimension array, be it integer, real or string, to be sorted.

BASIC COMMAND LIST:-
*PROG, *BAD, *EXTEND,
*PACK, *SORT, *PAGE,
*ENVELOPE, *FIND,
*REPLACE, *XREF,
*TRON, *TROFF, *CHAR,
*EDIT, *EDKEY.

MACHINE CODE COMMAND LIST:-
*MCODE, *MOVE,
*CROM, *SLOW, *GET,
*PHEX, *GO, *MON,
*HEX, *SPACE, *DGET,
*DISCED, *DIS, *DEBUG,
*CRC, *REL.

Designed with the serious programmer in mind, a 16K Eprom packed with a multitude of programmer friendly utilities, as with all SLAVE'S, SLAVE is instantly available and will obey an extensive range of commands. So why not invest in more muscle for your BEEB, and get some help with the heavy work!!! SLAVE has over 30 comprehensive machine code and basic tools.

**A&F Software Ltd.,
Unit 8, Canal Side Ind. Est.,
Woodbine St East,
Rochdale OL16 5LB**

**24 hrs HOTLINE
0706 341111**

Slave is available direct from A&F Software Ltd for only £39.95. This includes post, packing, VAT, and User Guide.

Please send me a Slave, I enclose my cheque/PO for £39.95.

Cheque N°. ____________ Please debit my Access/Visa N°. ____________

Name ____________

Address ____________

____________ Telephone: ____________

**Remittance to:-
A&F Software Ltd.,
Unit 8, Canal Side Ind. Est.,
Woodbine St East,
Rochdale OL16 5LB**

Please allow 14 days for delivery.

TECHNOMATIC

AUGUST '85

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305 Edgware Road, London W2 Tel: 01-723 0233

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and 15% VAT to order value

ACORN COMPUTER SYSTEMS

BBC Model B	£299(a)
BBC Model B + DFS	£346(a)
BBC Model B + Econet	£335(a)
BBC Model B + Econet + DFS	£399(a)
BBC Dust Cover	£4(d)
BBC Carrying Case	£12(b)

UPGRADE KITS

Acorn DFS Kit	£80 (d)	1.2 OS ROM	£7.50 (d)
Econet Kit	£55 (d)	DNFS ROM	£17.50 (d)
BASIC II ROM with User Guide	£22.50 (d)		

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Printer Server Rom	£41 (d)
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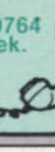

Technical Information:
1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

BBC B PLUS

£409 (a)

Now available from stock.

EPROMs/RAMS

2764-25	£3.00 (d)	6264LP-15	£7.00 (d)
27128-25	£6.50 (d)		

ACORN BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value. £325(a)

ACORN's multiplotter driver for Bitstick graphics £79(c)
(All popular plotters included)
Epson FX80 screen dump routine for Bit Stick. £35 (d)

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1 Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive £1299 (a)

30 Mbyte Winchester Drive £1999 (a)

Add £200 to the cost if File Server Level III is to be installed.

ACORN 2nd PROCESSORS

The Z80 2nd Processor converts your BBC into a CP/M business computer. Complete with comprehensive free software. £348(a)

The 6502 2nd Processor provides both an increase in speed and memory £175(a)

ACORN P-SYSTEM

The long-awaited-for portable operating system has arrived. Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. £263(b)

TORCH PRODUCTS

GRADUATE: The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and single/dual drives, it simply connects through the 1 MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all linkable. (This highly acclaimed software is now available for the IBM PC at a cost of over £400!)

Graduate G800/2 £899 (a)
(Offer valid for limited period only).

SPECIAL SUMMER PROMOTION on Torch Disc & Graduate

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic	£275 (a)
Z80 Disc Pack ZDP240 with software as above	£550 (a)
20Mb Hard Disc + 1 × 400K Floppy Drive	£1,950 (a)
Unicorn 68000, Unix OS/Z80B/512K, 20MB Hard Disc, 400K Floppy	£3495 (a)

TECHTEL 'IN-HOUSE' INFORMATION CENTRE

A unique concept that allows you to provide information in public places. A member of the public is able, without assistance, to view information about your products or services.

Techtel is a complete package allowing you, in conjunction with a BBC and disc drive, to set up an in-house 'Viewdata' type information system. The friendly software package will allow you to set up a 'Prestel' type database of up to 700 pages, (depending on drive) containing both graphics and text. This menu-driven database could hold details of products or services supplied by your company. Typical user would be any company needing to pass information to the public e.g. banks, dept. stores, hotels, travel & estate agents etc. etc.

The package also includes a 'carousel' type display, allowing each frame to be displayed for a specified time, before moving on to the next frame.

A unique facility of Techtel is its 'through-glass' keyboard. Its special numeric keyboard can be placed inside a shop window, yet may be used by customers outside — thus allowing the unit to be left unattended.

The package includes the special keypad, Teletext Loader and Editor, and full instructions.

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Tel: 01-450 9764

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PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- Epson Compatible Control codes
- 80 or 156 Column
- NEAR LETTER QUALITY Print using 23 × 18 matrix
- Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- Dot Addressable graphics in various modes
- 3K buffer which can also hold user defined characters
- Extra ROM/RAM socket for custom print fonts
- Friction & Tractor feed with built in paper roll holder

KP810 (80 column) **£255 (a)** KP910 (156 column) **£349 (a)**

EPSON:

EPSON JX-80 — The new de-luxe full-feature colour dot-matrix printer 160 cps **£499 (a)**

EPSON LX80 — The new low cost Epson dot-matrix with NLQ. Includes a variety of print styles, user defined characters etc. Special Introductory Price LX80 **£242 (a)**

RX80T **£210 (a)** RX80FT **£220 (a)** RX100 **£345 (a)**
FX80 **£315 (a)** FX100 **£430 (a)**

EPSON JX-80 Full Colour Printer **£525(a)**

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. **£99(d)**

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportional spacing • Underline • • Bold • Shadow print • Super/Sub script + many other features.

BROTHER HR15 **£325(a)**

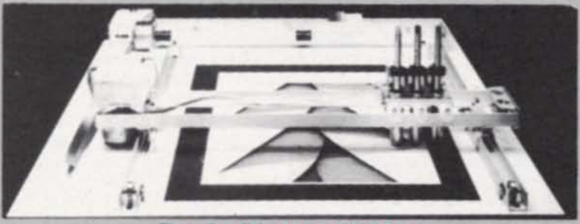
JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 **£325(a)**

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete with all accessories.

Workstation Complete £490(a)



Basic Plotter £270(a)

Opto Sensor **£72(c)** Drill/Router Attachment **£79(c)**
Power Supply: PS12V **£42(c)** PS24V **£78(c)**
Scandump Utility Disc **£14.95 (d)**

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c);
8132 Apple II £60(c); 8165 IEEE + Cable £65(c)
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d);
FX80 Dustcover £4.50(d); LX80 Tractor Unit £20(c);
Spare pens for HI80 £7.50/set (d)
KAGA TAXAN: RS 232 Interface + 2K buffer £78(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);
Sheet Feeder £182(a) Tractor Feed Attach £129(a)

BROTHER HR15: Sheet Feeder £189(a) **Ribbons Carbon or Nylon** £4.50(d)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" × 11" £13(b) 2000 sheets 14.5" × 11" £18.50(b)
Labels per 1000s: Single Row 3½" × 1 7/16" £5.25(d)
Triple Row 2-7/16" × 1 7/16" £5.00(d)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. **£399 (a)**

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer **£199 (a)**
BBC Cable Set **£30**

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	**Serial**
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64(c)
4 Computers to a Printer	36V36-4 £85(c)	25V25-4 £74(c)
2 Computers/2 Printers X-over	36V36-X £69(c)	25V25-X £69(c)
BBC Cable Set 3 to 1 (1m ea.)	£32(c)	£34(c)
BBC Cable Set 4 to 1 (1m ea.)	£39(c)	£41(c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50(c).

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 × 192mm + menu area. Comes complete with a CAD package. £110(b). DDX software £99(b).

RH Light Pen. Now only **£29 (d)**

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MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB		with PAL & Audio	
1431 Std Res	£185(a)	1431 AP Std Res	£205(a)
1451 Med Res	£240(a)	1451 AP Med Res	£280(a)
1441 Hi Res	£389(a)	These monitors can receive TV programs thru a Video Recorder	

Swivel Base for Plastic 14" Microvitecs £20(c)

20" RGB with PAL & Audio

2030CS Std Res	£380(a)	2040CS Hi Res	£685(a)

KAGA TAXAN 12" RGB

VISION II Hi Res	£225 (a)	VISION III Super Hi Res	£325 (a)

SANYO CD3125NB 14" RGB Std Res £159(a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
PHILIPS BM7502 12" Hi Res Green Screen	£75(a)
PHILIPS BM7522 12" Hi Res Amber Screen	£79(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

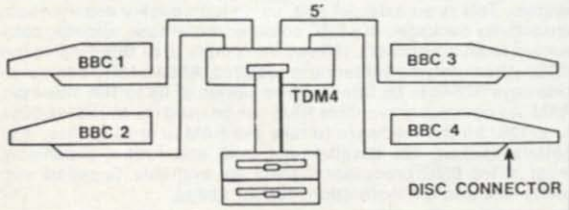
BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. £260(b)

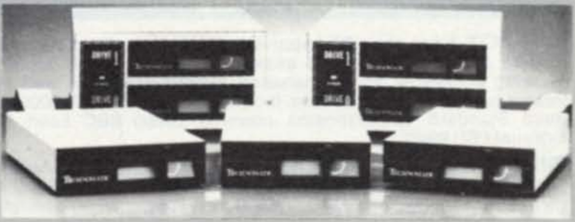
DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected to one dual will allow 8 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)	£135(a)
TDM2 Dual Unit (2 computers)	£75(b)

DISC DRIVES



TECHNOMATIC drives are fitted with high quality slimline Mitsubishi mechanisms and represent the state of the art in drive technology. The drives are built to the highest standards and are tested to their full performance capability before packaging.

Single drives are available with or without integral mains power supply. The dual drive power supplies are switch mode type and are generously rated to ensure minimum heat generation even over long periods of operation. All drives with integral power supply are fitted with a mains indicator.

The drives are housed in attractively designed metal casings painted in hard wearing BBC matching paint. The dual drives can be supplied in stacked version or with built-in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer installation.

The 80T drives are supplied with the 40/80 track switching modules at no extra charge. The 40/80 track switches are conveniently positioned in the front on dual drives to enable easy switching between the tracks.

All drives are supplied with all the necessary cables, manual and a formatting disc. The mains powered drives are also fitted with a 13A mains plug suitably fused. The drives are ready to be fitted to the computer. All drives are capable of operating in single or double density modes.

Single Drives:		With integral psu:	
1 × 100K 40T SS : TS100	£85(b)	PS100	£120(b)
1 × 400K 80/40T DS : TS400	£125(b)	PS400	£145(b)

Dual Drives: (with integral psu) Stacked Version:		Plinth Versions:	
PD200 2 × 100K 40T SS	£190(a)	PD200P	£215(a)
PD800 2 × 400K 80/40T DS	£265(a)	PD800P	£289(a)

3.5" Drives:
These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

TS35 1 × 400K 80T DS £99(b) TD35 2 × 400K 80T DS £175(b)

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD **£13(c)**	40T DSDD **£18(c)**
80T SSDD **£22(c)**	80T DSDD **£24(c)**

3½" discs. Pack of ten £38(c)

FLOPPICLENE DRIVEHEAD CLEANING KIT

The FLOPPICLENE drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. Floppiclene with 20 disposable cleaning kits. £14.50(b)

DISC ACCESSORIES

Single Disc Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 40 Discs £14(c) 100 Discs £19(c)

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COMMUNICATIONS

MODEMS

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered £62(c) BBC Lead £6 External PSU £9(c)

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21; V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. WS2000 £129(c) BBC Serial Cable £7.

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line £30(d).

BBC User Port cable (for modem control) £7.

SKI KIT (Allowing total control of the modem by your computer) £10.

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers for autodialling £10.

WS2000 Auto-Answer Card £30(d).

(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. £25(d)

NEW WS 3000 A new range of modems featuring 'Hayes' protocols. 1200/1200, 2400/2400, 4800/4800 bauds full duplex, auto answer, auto-dial, data security option etc. Please phone for details.

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. Any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time clock. £29(d)

TERMI-II A good general purpose communications package for bulletin boards, electronic mail etc. (Not for PRESTEL) £28(d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £59(d).

'TIME-WARP' REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. £29(c)

time-warp
real-time clock

SMARTMOUTH

The original 'infinite speech' synthesiser. A ready built, self contained speech synthesiser unit attractively packaged with a built in speaker. Plugs into the user port. £31(c)

TECHNOMATIC

All prices exclude VAT

EPROMER II

A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered.
- Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- Eproms upto 16K (27128) programmed in single pass.
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.
- Checksum facility allows for easy identification of programmed roms.

EPROMER II with Manual & Cassette £99(b) Software on disc £3
ROM based software £10

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59(b).

UV1T as above but without the timer. £47(b).

ROM/RAM EXPANSION SYSTEMS

COMPUTER VILLAGE ROM/RAM BOARD: A beautifully designed expansion board, simply plugs in — no soldering. (Fits into 6502 and Video ULA Skt.). Fully buffered with 16 paged Rom capacity. Option of 16K paged Ram, with software initiated write protect — battery backup is included. It allows nine different ROM/RAM configurations. £43(c)

ATPL SIDEWISE ROM EXPANSION BOARD: A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £39 (d) Battery Backup Kit £18 (d).

RAMROM-15: The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £86(b).

ARIES B-12 Board £40 (d) **ARIES B-20 Board £78 (d)**

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RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function, instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-2 (with 'microdraw').	£52 (b)
RB-2I (with 'icon artmaster').	£60 (b)

AMX MOUSE

This sophisticated mouse has many advanced features such as Icons, Windows etc. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £69 (b)

AMX DESK — An organisational program, including memo-pad, telephone/address book, diary, alarm, calculator etc. On Disc. £22(d)

AMX UTILITIES — provides new drawing facilities including Zoom, colour sketch and more. On Disc. £13(d)

ACORN TELETEXT ADAPTOR £192(a)

ACORN IEEE INTERFACE

This interfaces enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282(a)

ACORN MUSIC 500

Convert your BBC micro into a sophisticated music composition aid and sound effects generator. Custom made software will provide you with the flexibility to compose, experiment, perform and teach music. Stereo output can be connected to a sound system including your home stereo unit. Full specification on request. £174(a)

DATABASE MANAGEMENT SYSTEMS

The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include • almost unlimited file size (max 10Mbyte) • supports up to 4 drives • Max of 5000 records per file • max 6K record size • max of 62 fields • 9 level hierarchical search system with facilities to store results of searches. • User defined variables • generates form letters from records.
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STARdataBASE: A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £69(d)

NEW

VIEWSTORE: An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte!. Maximum record size 60K. £52(c)

CP/M SOFTWARE FOR TORCH Z80 ACORN Z80 PROCESSOR

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors.

WORDSTAR PROFESSIONAL: The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive yet friendly manual, step-by-step training guide, command cards, on-screen menus with four levels of help messages etc. etc. SpellStar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications where lists are selected on a range of criteria. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering and much more.

WORDSTAR PROFESSIONAL £310(a)
WORDSTAR £275(a) MAILMERGE £145(a)

DBase-II: Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation and maintenance through to running accounting ledgers and payrolls. In addition to standard database features it provides much more. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data, and fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful. £335(a)

FRIDAY! is a file management system designed for the new comers to the computer field. It handles mailing lists, invoices, salary cheques, sales and inventory screens, and reports. Use of plain English and specially devised menu system makes it very simple to use.
FRIDAY! reads and writes dBASE II files and standard ASCII files. £175(a)

SuperCalc-2: A powerful decision making tool which helps to solve complex 'What if...' financial modelling and forecasting questions. With a working area of 63 columns and 255 rows, Supercalc 2 takes full advantage of colour and full memory. It allows consolidation of different spreadsheet files, sorting, a wide choice of formats. Full documentation with easy to follow lessons and single key commands make the use of Supercalc2 very easy. Separate windows provide for display of results and formulae simultaneously. Calendar and date calculations simplify calculations on loan repayment and periods. £180 (a)

Pro-Pascal: A full implementation of the International Standard for Pascal (ISO 7185) apart from the optional conformant parameters feature. In addition to the standard features of Pascal, Pro Pascal includes: dynamic strings for character and string manipulation, 9 digit integers and random access file handling for data processing applications, single and double precision floating point arithmetic, an assembler level interface for systems programmers, and separate compilation of program segments for building libraries of commonly used procedures and enabling very large object programs to be constructed. Pro Pascal is a 3 pass compiler, converting a source program into efficient Z80 machine code. The package includes a compiler, run-time library, link editor, library manager and cross referencing utility. £220(a)

BSTAM: A telecommunication facility used for transmitting any size CP/M file. £165(b)

Other packages available include CIS-COBOL, INFOSTAR, FRIDAY, DMS +, FMS, SAGE, ATI TUTORIALS, MACRO-80 etc. Please telephone with your requirements.

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ROMs/SOFTWARE

VIEW Acorn's new version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. £48(c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52(c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £13(d)

WORDWISE: One of the most popular word processors for general use **£34(d).** Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d).** If bought with Wordwise: No p&p and only £14.

WORDWISE PLUS: The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. New facilities include: 2nd Processor compatible allowing 80 column previewing in all cases, a new Basic-like language, new editing features and embedded commands etc etc. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. A new 56 page introductory manual and a 180 page reference manual complete this rather special package. Finally, it is able to use existing Wordwise files without any modification. £49(d)

SPELLCHECK II: A ROM based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17,000 words on 100K drive. Fully compatible with 6502 second processor. £26(d)

6502 DEVELOPMENT PACKAGE: A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £43.35 (d)

ISO-PASCAL: Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £60(c)

OXFORD PASCAL: A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'stand-alone' software. £43(c)

ACORN LOGO: A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £60(b)

ULTRACALC 2: This enhanced version of the original BBC Publications popular spreadsheet ROM includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normality found in well designed spread-sheets. £50 (d)

INTERSHEET: The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £49(c)

VIEWSHEET: Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be re-arranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £52(d)

BCPL: A full implementation of the BCPL compiler language consisting of the language ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. £52(b)

BCPL STAND ALONE GENERATOR: Utilities in this package enable the programs developed using the BCPL ROM to be converted so that they can be run on any BBC micro whether it has a BCPL ROM or not. Stand alone programs for other 6502 based systems can also be developed. £43(d)

BCPL CALCULATIONS PACKAGE: Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30(b)

ACORN LISP Rom £43(d): FORTH £43(d): COMAL £43(d)

COMPUTER CONCEPTS COMPILER: Please phone for availability.

G:FORTH: An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM. £43(d)

DISC DOCTOR: Computer Concept's popular disc utility ROM which adds 20 commands to the DFS system. £27(d)

DISCMASTER: Disc Utility. £16(d)

EXMON-II: Advanced M/C Monitor. £24(d)

TOOLKIT: Adds 27 new commands to BBC Basic. £23(d)

SLEUTH: Basic Debugger £24(d) **GRAPHICS ROM** ".." £27(d)

PRINTMASTER: The ROM that features the most versatile screen dumps for the Epson MX/RX/FX80 and KAGA PRINTERS. Includes mode 7, magnification, character definition, enlarged text, etc. etc — in short — this ROM does it all! £28(d)

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MUROM: Music Development ROM. £24(d)

BILLBOARD: A useful program that enables your BBC to produce super-large 'Billboard' type characters i.e. a continuous horizontal scrolling of super-large characters. Supplied in ROM. £16.50(d)

HELP: ROM based comprehensive on screen HELP facility to aid and speed up programming. £21(d)

MICROGUIDE: Keyboard Key-Plate. £16.50(d)

MICROTEXT: The authoring system from the National Physical Laboratory. **Disc** £53(b) **Cassette** £43(b)

REPLICA II: 40 & 80 Track Versions available. £10.35(d)

BROM: The new utility ROM from Clares — a Toolkit ROM that gives you full screen editing. Many extra functions are included. £30(d)

BEEBUG DESIGN £16.50(d)

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MASTERFILE II: The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. The disc version allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWISE/VIEW £16.50(d) Disc (80 or 40T).

HERSEY CHARACTER: Font generator £12.50(d)

When ordering software on disc please specify track format (40/80)

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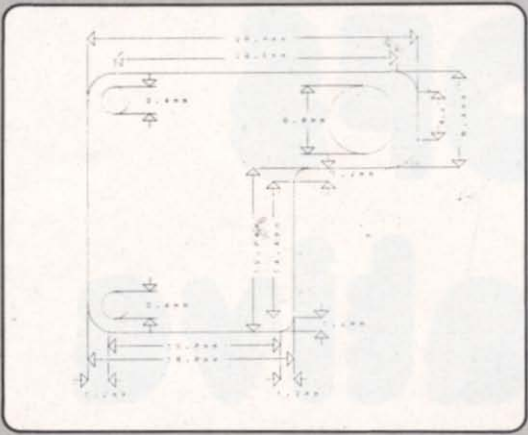
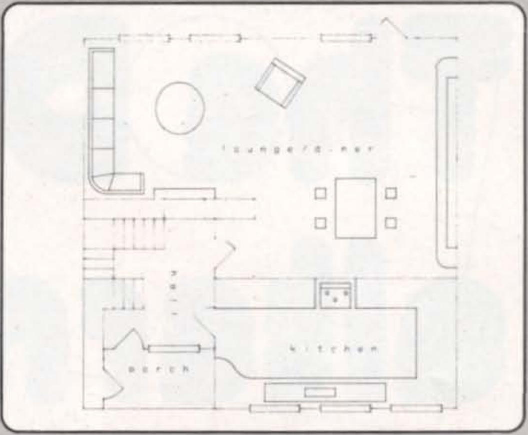
NOVACAD

Computer Aided Draughting for the BBC Micro





A sophisticated CAD package with unique facilities which until now were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive then NOVACAD's capabilities are further enhanced.

- Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. (Mode 0 screen display only 1 6 the number of dots). The drawing can be 4 windows across and 5 up.
- Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain upto 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
- ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned. COPY facility speeds up the drawing if particular shapes are repeatedly used.
- The zoom facility allows the user to magnify any section of a drawing by upto 20 times to make it easier to insert details.
- User definable grid helps the user set his own scaling for the drawings.
- Horizontal and vertical displacements can be measured in any user defined scale.
- Up to 8 'levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly useful in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
- Text can be added at any position vertically or horizontally.
- Use of 2nd processor will allow use of colour, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
- Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
- Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
- An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.
- Version with tracker ball utility to be available soon.

NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79(c).

Plotter Utility Program £21.50(d).

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The DDFS alternative

JIM NOTMAN considers the limitations inherent in the Acorn DFS and reviews a new offering from Watford Electronics

IT is well known that one of the major deficiencies of the Acorn DFS on the BBC Micro is the Intel 8271 floppy disc controller. This chip is in short supply, expensive and only supports single density recording.

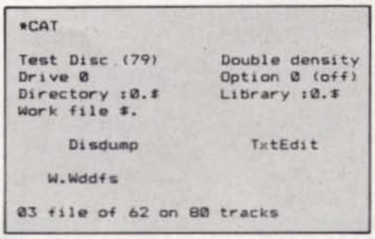
A number of companies are now producing alternative interfaces with double density controllers. They are cheaper, easier to get hold of, and they can put much more information on a disc. Not twice as much, as the name suggests, but 60 to 80 per cent more depending on the system.

Now even Acorn have moved away from the 8271 with the new BBC B+ having a new controller, the 1770.

The 1770 DFS in the BBC B+ adds extra commands to the normal single density Acorn DFS. These include a formatter and verifier, as well as commands to give the amount of free space on the disc and one to close any open files.

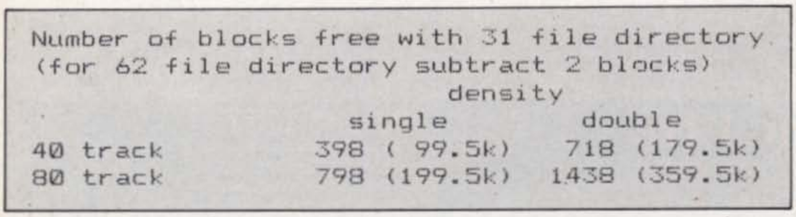
So is there any need for another DFS? In a word, yes.

A number of limitations still remain on the Acorn DFS. It is still only implemented as a single density system, a maximum of 31 files are allowed in a catalogue and a number of utilities – such as a sector editor – are missing.



```
*CAT

Test Disc (79)         Double density
Drive 0                Option 0 (off)
Directory :0.$         Library :0.$
Work file $.

     Disdump                TxtEdit

   W.Wddfs

03 file of 62 on 80 tracks
```

Figure I



```
Number of blocks free with 31 file directory
(for 62 file directory subtract 2 blocks)
                          density
                     single          double
40 track           398 ( 99.5k)    718 (179.5k)
80 track           798 (199.5k)   1438 (359.5k)
```

Figure II

I was particularly interested to see the new offering from Watford, as their single density system is already a very credible alternative to the standard Acorn DFS as well as being based on the same 1770 chip.

Fitting the new DDFS is easy. If no disc interface is already fitted, nine small IC chips, the same as the standard interface use, have to be plugged in. The double density controller is mounted on a small printed circuit board 55mm x 79mm which is fitted into the IC socket where the 8271 would normally reside. Software for the DDFS is on a 16k eprom inserted into one of the paged ROM sockets.

Anyone who has the Watford single density system will find this new system familiar, with the same commands working in the same way.

On typing in *CAT the only immediate difference is that the density of the disc is now displayed with the catalogue information – see Figure I. I was expecting a delay, usually present with dual density systems, while the controller sensed which density the disc is in, but with this DDFS the response is almost immediate.

The system defaults to the single

density mode on hard reset to make for faster booting of the Z80 second processor and a number of other pieces of software.

The Watford DDFS gives both single and double density working as well as the option of having 31 or 62 files, selectable when the disc is being formatted. This increased number of files is possible by a technique which effectively extends the catalogue rather than having a number of separate catalogues.

The DDFS tries to be as compatible as possible with the Acorn DFS, with the same command names having the same action, but wherever possible improving on the original.

The disc formatter, *FORM, now asks the extra question, "Double density?" The single density option produces a disc which is 100 per cent compatible with all single density systems if the 31 file catalogue is used.

*HELP SPACE shows the amount of free space on the disc. After formatting a disc this shows a large increase in capacity in the double density mode (see Figure II).

*HELP FILES gives information on any open files. It can be so helpful when debugging file handling programs that I'm surprised that nobody has copied the idea yet.

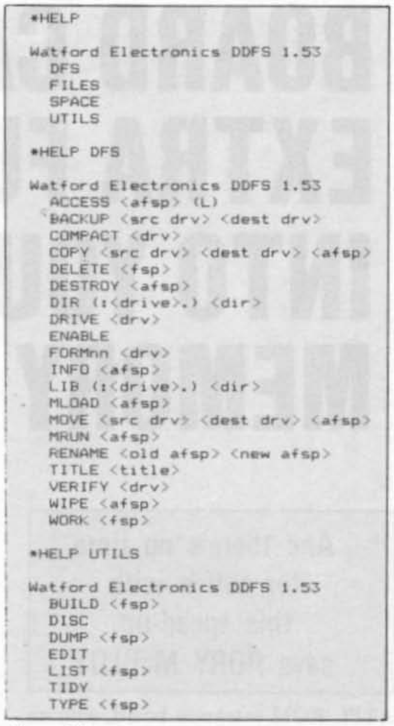
*MOVE is like *COPY, but you are asked to confirm with the Y or N key before a transfer can take place.

*MLOAD and *MRUN are like *LOAD and *RUN but will relocate the program to the load address given in the catalogue information.

*WORK gives a workfile name, so that simply typing in SAVE "" will save a file using the workfile name. This can also be used to give version numbers which will be incremented on each save.

A 40 track disc can be read and written on an 80 track drive. The command for doing this is *OPT40 followed by the drive number. *CATing a disc on a drive after this will include the message "double stepping". This replaces the *FX110 of earlier versions. *FX111, which gives the last drive a load took place from has also been replaced, this time by an OSARGS call, to prevent any possible clash with other hardware such as the Aries board.

*EDIT enters the disc sector editor. As you can see in Figure IV a whole block can be displayed, as the screen is in Mode 0. This can be a little difficult to read clearly if it is displayed on a TV.



```
*HELP

Watford Electronics DDFS 1.53
  DFS
  FILES
  SPACE
  UTILS

*HELP DFS

Watford Electronics DDFS 1.53
  ACCESS <afsp> (L)
  BACKUP <src drv> <dest drv>
  COMPACT <drv>
  COPY <src drv> <dest drv> <afsp>
  DELETE <fsp>
  DESTROY <afsp>
  DIR (:<drive>.) <dir>
  DRIVE <drv>
  ENABLE
  FORMnn <drv>
  INFO <afsp>
  LIB (:<drive>.) <dir>
  MLOAD <afsp>
  MOVE <src drv> <dest drv> <afsp>
  MRUN <afsp>
  RENAME <old afsp> <new afsp>
  TITLE <title>
  VERIFY <drv>
  WIPE <afsp>
  WORK <fsp>

*HELP UTILS

Watford Electronics DDFS 1.53
  BUILD <fsp>
  DISC
  DUMP <fsp>
  EDIT
  LIST <fsp>
  TIDY
  TYPE <fsp>
```

Figure III

The language entry point has been removed so that the editor will no longer be entered if the eprom is placed in the highest numbered paged ROM socket. This also keeps the editor completely within the BBC Micro itself when a second processor is fitted avoiding any tube problems.

*TIDY will close any open files on the disc. This has now been implemented on the new Acorn DFS as *CLOSE.

The DDFS takes advantage of improvements that have evolved with the single density system. Drive information is now retained through a soft Break, that is when the Break key is pressed by itself or with any other key than the Ctrl key.

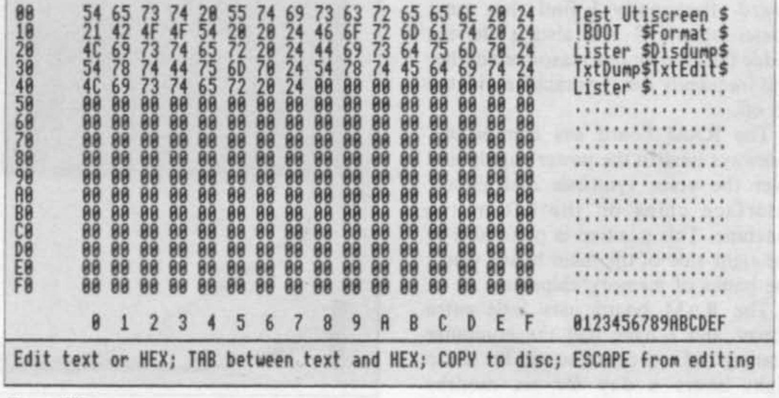
This includes the workfile name, current directory library and drive, the *OPT 1 double step and density settings and any open files left open.

The DDFS is now more compatible with the Econet system and will run the Acorn level 2 file server system. It has also been made compatible with the teletex system.

A number of people I spoke to at the recent Micro User Show thinking of buying a double density system such as this were put off by the thought that it would not be compatible with the software they wanted.

An extensive 8271 software emulator is built into this DDFS and all the major pieces of software will work with it. So much so that a surprising paradox has now arisen.

Writers who depend on the characteristics of the 8271 for software protection now find that their software is more likely to run on the latest Watford DDFS than on the new Acorn 1770 DFS – even some versions of Acornsoft products.



```
                    Watford Electronics DDFS Disc-Fix

OS command:

Track 00 Sector 00    Absolute sector 000     File name $.        Disc 0

          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F    0123456789ABCDEF

00        54 65 73 74 20 55 74 69 73 63 72 65 65 6E 20 24   Test Utiscreen $
10        21 42 4F 4F 54 20 20 24 46 6F 72 6D 61 74 20 24   !BOOT  $Format $
20        4C 69 73 74 65 72 20 24 44 69 73 64 75 6D 70 24   Lister $Disdump$
30        54 78 74 44 75 6D 70 24 54 78 74 45 64 69 74 24   TxtDump$TxtEdit$
40        4C 69 73 74 65 72 20 24 00 00 00 00 00 00 00 00   Lister $........
50        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
60        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
70        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
80        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
90        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
A0        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
B0        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
C0        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
D0        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
E0        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
F0        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................

          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F    0123456789ABCDEF

Edit text or HEX; TAB between text and HEX; COPY to disc; ESCAPE from editing
```

Figure IV

BOARD CAN PUT EXTRA FUNDS INTO YOUR MEMORY BANK

And there's no time for coffee with this speed-up, says RORY McCLOY

32k RAM board
Watford Electronics

IT was more than two years ago when I met those frustrating Bad Mode . . . and No Room . . . messages on my first ventures into Modes 0, 1 and 2. "You need some extra memory", I told myself. A second processor came to mind – nothing else did.

Fortunately in the summer of 1984 Watford Electronics produced their 32k RAM board. 20k of the extra RAM available on this board can be used as a committed parallel memory bank to which the memory required for high-resolution graphics, from HIMEM to &8000, may be switched.

If the RAM board is active, HIMEM remains at &8000 and there is approximately 28k of user Basic program memory in any mode. This represents a gain of 20k in Modes 0, 1 and 2, 16k in Mode 3, 10k in Modes 5 and 6, but only about 1k for the user in Mode 7.

Tough competition based on the same "transparent" screen memory principle comes from the Aries-B20 and Raven-20 boards, but Watford's solution offers additional versatility. The remaining 12k RAM, or the entire 32k board, can be used to buffer any of nine different channels – the most immediately useful being for a printer.

Fitting the well-constructed board is straightforward for those used to plugging in ROMs and only takes a few minutes. On the MkII board only the 6502 chip has to be eased from its socket and placed on the board – still an un-nerving procedure even for the experienced computer surgeon.

Watford suggests that the board is stuck to the lid of the computer with the ribbon cable trailing down to the main board. Personally I find this most unsatisfactory. I am always delving inside the case for one reason or another and frequently run the machine with the lid off.

The RAM board sits comfortably sideways next to the power supply and over the voice synthesis and Econet interface chips on the left of the machine. This position is preferable to the right side of the main board where the banks of memory chips lie.

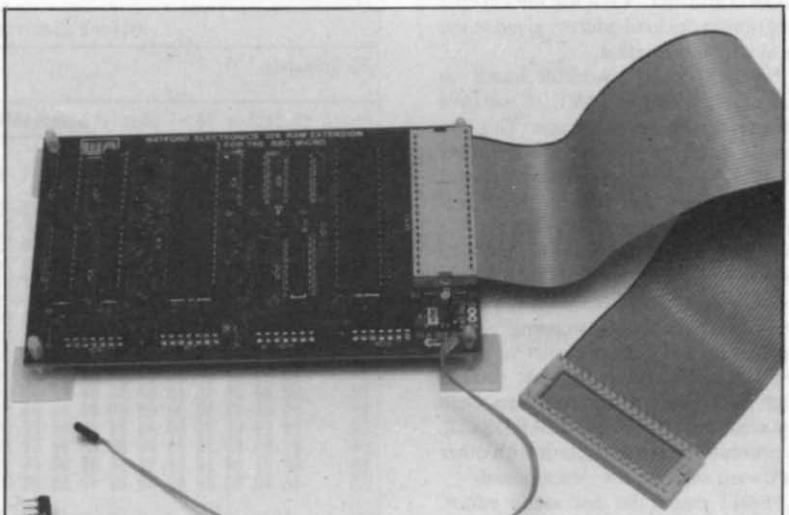
The RAM board uses little extra power and I have had the computer running (lid on) continuously for six to eight hours a day for six months complete with RAM board and a full ATPL ROM extension board, with no overheating or voltage problems.

This illustrates another advantage of the Watford RAM board over the Aries-B20. The former is on a ribbon cable which can lie beneath other makes of ROM extension boards, whereas the anatomy of the Aries-B20 requires an Aries-B12 ROM extension board – a definite disadvantage if you already own a ROM board.

The software to drive the board comes in an eprom. When I first switched on I was puzzled not to see the expected message "Watford Electronics 32k RAM" appear at the top of the screen to let me know the board was active on power-up, although the board was in fact working.

The concise but adequate instruction manual tells you to plug the eprom into the "lowest" priority socket. This should be the highest priority, lowest numbered, socket so that the RAM board eprom is encountered by the operating system *before* the Basic ROM.

The RAM is switched off simply by



The Watford 32k RAM board

Ctrl + Break but not by Break or Shift + Break. The presence or absence of the Watford message tells you if the board is active.

Alternatively the status of all the board's facilities can be displayed by typing *H. RAMSTATUS. For example:

RAM board active.
Currently switched to data area 1.
Small printer buffer active.
Purge ability inactive.
&2EFF characters free in the buffer.
Page workspace at &1700.
OSHWM (PAGE) at &1A00.
HIMEM at &8000.
Current screen Mode 3.

It is a pity that this useful information could not be prompted by a much briefer command. Note that PAGE has been increased by 256 bytes due to the software. This can be reclaimed or moved by shifting the RAM board workspace to say &0A00 (type *MWS 0A) and has to be done if you want to set PAGE down to &1100. The definitions for *CLAIMON and *CLAIMOFF are incorrectly reversed in my manual.

There is a useful selection of commands available. The most important is *BUFFERON (S/L) (0-8). The first suffix determines a small 12k buffer (by default) or a large 32k buffer. The second suffix allocates the buffer type:

0 Keyboard.
1 RS423 input.
2 RS423 output.
3 Printer (default setting).
4 Sound channel 0.
5 Sound channel 1.
6 Sound channel 2.
7 Sound channel 3.
8 Speech.

These options should accommodate most of the vagaries of BBC users and option 1 will probably become increasingly popular as more people wish to buffer the input from their modems.

Since the buffer on the board acts as an extension of the BBC Micro's own internal buffer when option 3 is selected for a printer buffer, it matters not whether a serial or parallel printer is in use.

Commands are available to enable or disable the board buffer contents to be cleared, along with the micro's own buffer, such as by Escape.

The printer buffer capabilities of the Watford board are merely the icing on a much-enlarged cake available for word processing when an 80 column screen has to be supported. For example there are 25,854 bytes of memory free for use by View in Mode 3 instead of the usual 9,726 bytes.

Identical advantages apply to ViewSheet. The RAM board functioned perfectly with View A1.4 but the changes Acorn made to the current View A2.1 version caused the word processor to hang-up when the RAM was active.

However, Ian Smith has upgraded the origin 1.2 RAM software for Watford to the 2.0 version, which has solved the problems provided a software patch is activated using the *XWORD command to enter View instead of the usual *WORD. Entering *XWORD saves typing a string of commands (*RAMON: *BUFFERON: *PURGE-OFF:*WORD).

A similar command is available for Wordwise, but I have failed to get Wordwise (version 1.17) to work with the RAM board active. The fact that Wordwise pokes the screen directly may be the problem.

The advantage of the extra RAM is not so obvious in Wordwise until you try to preview a long text in 80 column mode.

Another surprise for Wordwise fans occurs when you type the usual *W. only to find you enter Watford's Memory Editor contained in the RAM board eprom as part of the software package – another bonus.

It took me some time to find out about these extra commands, which are on an additional information sheet which failed to arrive in my package. I hope these are now an integral part of the manual.

It is simplest to switch off the RAM board before running games which may not only shift the value of PAGE but poke the screen memory. The RAM also has to be disabled before using some databases such as STARdataBASE.

A thoughtful touch is the provision of extra commands for saving and loading screens since the screen memory is shifted from the micro's internal RAM, Data area 0, to the parallel RAM board, Data area 1. Data storage programs can make use of the additional 20k Data area 1 provided *FX34,1 is used to switch RAM banks.

The Watford 32k RAM board offers many excellent features and represents good value over its competitors at similar prices. It is a practical and economic alternative, particularly for word processing, to the complexities (and incompatibilities) of a second processor. Not surprisingly, the RAM board has to be disabled when a second processor is switched on.

I should warn readers of an unexpected disadvantage of using the 32k board. I used to have time for a cup of coffee while my daisywheel tapped away and printed a long document, but now the printer buffer frees the computer for further use almost immediately, despite the file being three times longer than previously possible.

COMMANDS

BUFFERON	Activates buffer.
BUFFEROFF	De-activates buffer.
CLAIMON	ROM claims memory.
CLAIMOFF	User claims memory.
MWS	Moves ROM workspace.
PURGE	Purges buffer.
PURGEON	Allows buffer purging.
PURGEOFF	Stops buffer purging.
RAMEDIT	Edits memory.
RAMON	Activates RAM.
RAMOFF	De-activates RAM.
SLOAD	Screen load.
SSAVE	Screen save.
XHELP	Lists ROM names.
XWORD	Replaces *WORD for VIEW.
XWORDWISE	Replaces *WORDWISE.

Watford Electronics

Dept. BBC, Jessa House, 250, Lower High Street, WATFORD, ENGLAND
Tel: Watford (0923) 37774/40588 Telex: 8956095 WATFRD
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KAGA KP810 NLQ PRINTER

This Dot matrix printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence. Proper adjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: ONLY **£239** (£7 carr.)

Kaga RS232 Interface	**£49**
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Kaga RS232 Interface + 16K Buffer	**£95**

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Similar to the KP810 but with 17" carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

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Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 ft) **£6** Extra long (6 ft) **£9**

We can supply leads to any required length.

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RX80	£4.50	£4.50
GP80	£4.50	-
GP100	£4.95	£3.95
GP250	£5.95	£3.95
KAGA KP810	£5.95	£4.75
CANON PW1080	£5.95	£4.75
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Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

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THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

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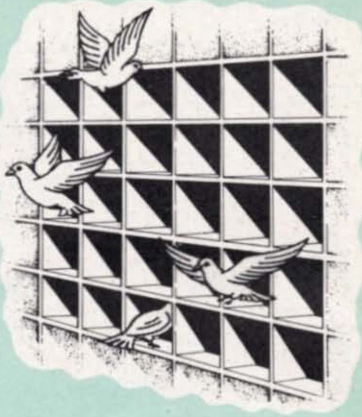

DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer. File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.
The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>>=, >=, <, &..
Many keywords are supported by the language: assign, compare, display, and, goto, iff, ift, print, read, search, spool and update.
Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

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(Please specify 40 or 80 tracks for the utilities disc)

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Gemini's 24K ROM based
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Continued ⟶

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The DELTA CARD

Fourth Generation BBC Hardware Representing new standards in economical computing power, the Delta Card is the latest in fast 6502 'processor' boards for the BBC micro. Speed increases of upto 100% are fully supported by an additional 48k of fast RAM (16k sideways and 32k for screen overlay). The Delta Card transforms your BBC into a far more powerful system with FULL compatibility with ALL standard programs.

16K SIDEWAYS RAM MODULES

These novel units each provide 16K of fast dynamic sideways RAM. Due to novel design methods, more than one of these may be fitted to your BBC, allowing you to add units as and when you want.

Le MODEM
The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.
- Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!
- Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.
- Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.
- Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.
- A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!
- FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!
- Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.
- Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.
- Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.

The NEW ROM/RAM board from Watford for all serious BBC users!

This second generation of ROM/RAM board combines the best of both the sideways ROM and RAM worlds into one advanced unit. When plugged into your BBC, this board offers the ability to use up to 8 standard sideways ROMs, 16K Battery backed up static RAM (used one of the sideways ROM options) and up to 128K of dynamic sideways RAM. All the RAM has both write protect and read protect. Of course, such an advanced board as this, does not require any soldering or flying leads; all that fitting involves is removing the CPU from its socket and replacing this into a special socket on the ROM/RAM board and then simply plugging in the ROM/RAM board.

Watford's REAL TIME CLOCK Unit

The RTC from Watford is a new product designed for the hobbyist and programmers alike. Powerful and comprehensive software supports the RTC itself. It has battery backup to maintain both the time and the date when power is removed from the unit. Interrupts can be generated to occur after specific times to allow the programmer great flexibility.

Just look at the features this unit offers!

- Connects to 1MHz bus.
- Address location adjustable.
- Year, month and day stored.
- Hours, minutes, second and tenths of seconds stored.
- Battery backed up.
- Extensive controlling software in ROM.
- Provides an additional 'User Port'
- Detailed manual.
- Timed interrupts.

Watford's Z80 SECOND PROCESSOR

Probably the most advanced Z80 Second Processor available for the BBC Micro. This powerful addition to a BBC system utilises our own DDFS controller to allow the Z80 to accept discs from a large variety of CP/M formats, including:

- Acorn
- Epson QX-10
- IBM PC
- Newbrain 40
- Osborne 2
- RML 480Z
- Superbrain
- Xerox/Crememco
- British Micro Mimi
- IBS Magnum
- Memory 8013 CPM
- Newbrain 80
- Osborne 2
- Sharp MZ80K
- Televideo
- Transam Tuscan

Solve your compatibility problems with the Watford Z80 Second Processor.

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price".
To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at £65 only.

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.42 Yes	1.52 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£65**
- *Acorn's DFS Kit complete* **£70**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£79**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density for our DDFS Unit at* **£40**

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

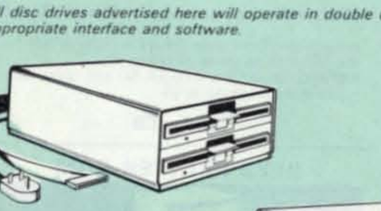
With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

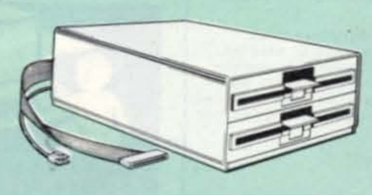
The drives we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £85		CS100 £110	
200K (360K)	CLS 200 £86	CLD200 £165	CS 200 £110	CD200 £180
400K (720K)	CLS 400 £120 £120 CLS400S	CLD 400 £165	£135 CS 400S	CD400 £185
800K (1.44M)		CLD800 £230 £240 CLD 800S		£259 CD 800S

- TWIN drive CASE, with Power Supply & Cables **£35**
Securicor carriage on Disc Drives £5

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40/80 Switchable

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – $5\frac{1}{4}$" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 × S/S D/D 40 Track Diskettes*	**£13**
● *10 × D/S D/D 40 Track Diskettes*	**£18**
● *10 × S/S D/D 80 Track Diskettes*	**£22**
● *10 × D/S D/D 80 Track Diskettes*	**£24**

QUALITY DISKETTES at KNOCK DOWN PRICES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs, each with a life-time guarantee. These are supplied packaged in an attractive plastic library disc box to protect them from damage.

10 × M4 S-S D/D 40 Track Discs	**£11**
10 × M5 D/S D/D 40 Track Discs	**£15**
10 × M7 D/S D/D 80 Track Discs	**£20**

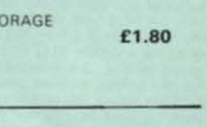
DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs	**£12**
M85 – holds upto 95 discs	**£15**

PLASTIC LIBRARY CASES

FOR $5\frac{1}{4}$" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

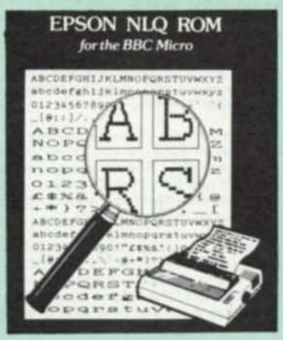
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.25** Twin (with PSU) **£3.90**

Continued →



Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

NEW LAUNCH

THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS
£15

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.
Price including comprehensive manual

£24

SPARK DUMP ROM

A screen Dump ROM for the Acorn/Olivetti Spark jet printers. Works in modes 0/1/2/4/5/7. Does vertical & Horizontal scaling. Positive & Negative grey scaling.

Only: **£12**

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £9

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

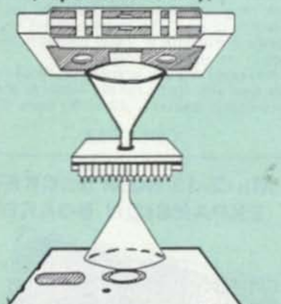
Professor Beeb Presents

Watford's New Launches

TRANSFEROM
ROMAS
DIAGNOSTICS DISC

TRANSFEROM

(Tape to Disc Utility)



After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

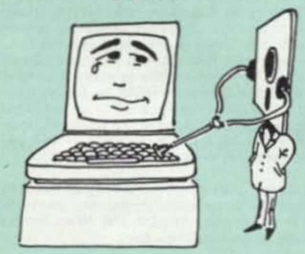
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£22.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at. The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £15.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ND
6502
HEX
REM
ASM
CHR$
FAL
LD
Z80

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

Special Offer

Purchase a copy of ROMAS and our EPROM programmer (retail price £113.00), and we'll give you the very special price of:

£99.00! (£4 p&p)

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

NEW LAUNCH

DELSYS

Digital Electronic System

The DELSYS project introduces the BBC Micro user through a structured approach to the fundamentals of microcomputer hardware design. For the first time an opportunity to grasp and understand the importance of Digital Electronic Systems in control applications is offered to owners of the BBC Micro. This is achieved by tackling a set of hardware project packs of varying degrees of complexity.
Introductory packs will educate users in the fundamentals of digital circuits by using practical experiments. A easy to understand manual explains the constructor, the operations and procedures in a step by step guide to basic design principles.
The first of the DELSYS project packs introduces the user to the concepts of logic gates, fundamental chip selection from technical data sheets, interfacing and bus structure techniques using the construction of a set of "Traffic Lights" as an example.

Call in for a demonstration on our stand at the Acorn User Show.

ROM MANAGER

'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.
This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.
The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

Price **£20**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10**

(Please specify whether 40 or 80 track disc when ordering)

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

Continued →

NEW LAUNCH

Le Modem

At last the complete communications package from Watford Electronics. Le Modem is a fully automatic modem, No Knobs, No Switches. Capable of 300/300, 1200/75 UK and Bell (USA) operation. Le Modem Auto dials, Auto answers and Auto Baud selects by using the latest technology in its design. Le Modem includes: The Modem, a 16K ROM to control it, a comprehensive manual, a FREE disc software and of course all the leads you need. Even a FREE mains plug. Le Modem, the Prestel terminal, the BT Gold terminal, the ultimate Communications terminal for the BBC Micro for Business or Pleasure. Le Modem brings information technology as close as the phone.

Call in at our stand, at the Acorn User Show for a demonstration.

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes COMMSTAR ROM & comprehensive manuals) **£119**

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

DEMON
Modem Package

Price: **£69.95** (Carr. £3)

Auto dial software disc **£4.25**

(Please specify 40 or 80 track)
(Note: Demon is not BT approved)

BEEBMON

Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

Superb value for money at only: **£24**

DISASSEMBLER ROM

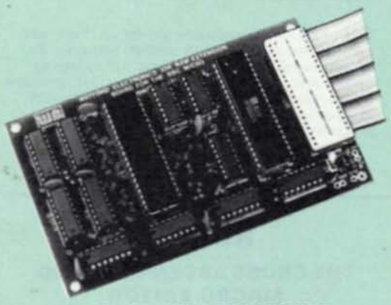
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

ONLY **£18**

Please write in for technical details.

32K RAM -

PRINTER BUFFER
EXPANSION BOARD



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- In "VIEW", type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc).
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Offer price

Only: £60

(Price includes a comprehensive manual and the ROM)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

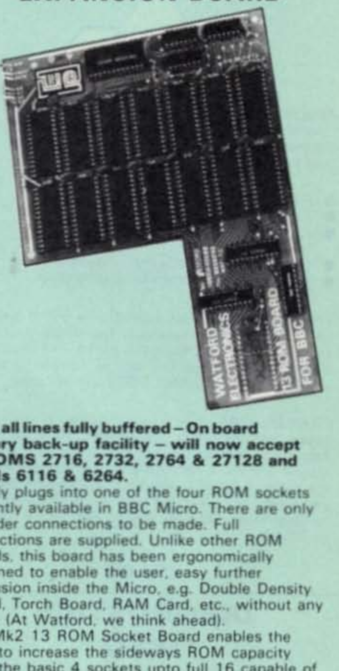
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.
A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£32**

Mk-2 13 ROM SOCKET
EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.
Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).
Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.

£2

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
INTER-SHEET	£49
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£25

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH:	£32

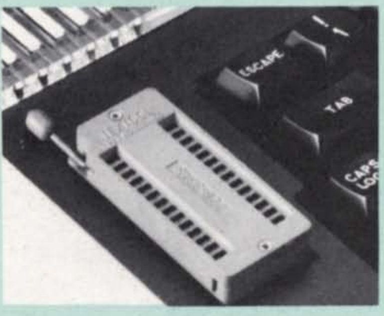
WORDWISE PLUS

Now available from stock	£47

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for **£19.** Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

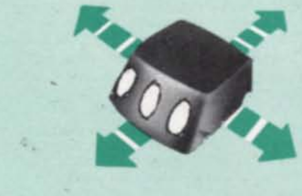
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



ONLY: £68.50

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

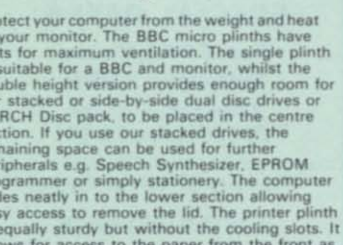
AMX Desk package	£19.00
AMX ART package	£11.50

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really bring those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

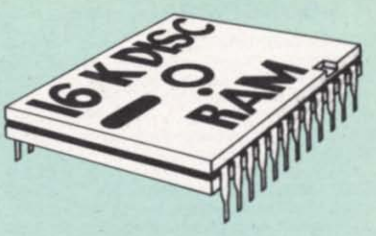
Price **£13**
(please specify 40 or 80 track disc when ordering)

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11**	(carr. £1.50)
DOUBLE BBC PLINTH	**£19**	(carr. £2.00)
PRINTER PLINTH	**£10**	(carr. £1.50)



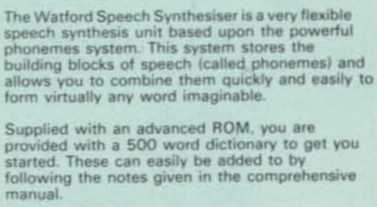
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £35

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £35

Continued →

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
6502 Application Book	£12.50
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£19.95
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
BBC Software Projects	£5.95
Brain teasers for BBC micro	£5.95
CP/M Handbook with MPM	£13.95
CP/M The software BUS	£8.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Easy Programming for the BBC Micro	£5.95
Exploring FORTH	£6.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Can Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Introducing the BBC Micro	£5.95
Introducing LOGO	£5.95
Introduction to PASCAL	£14.95
Let your BBC teach u to program	£6.45
LISP	£9.25
LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£16.50
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
Programming with Graphics	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£6.95

NEW LAUNCH

BEEB VIDEO DIGITISER

THE LATEST IN HIGH TECH FROM WATFORD

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£89 (Carr. £2)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

SPECIAL OFFER

Fast EPROMs for Sideways ROMs

2764-250nS £2.99
27128-250nS £6.95

Low power RAM for ATPL, Watford, etc. Sideways ROM/RAM Boards

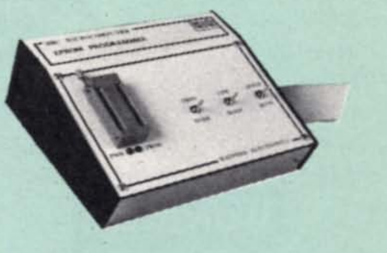
6264LP (8K) £7.25

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.

The features are:

- Will program 2716, 2732, 2532, 2764 & 27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

ERASER EB – Standard version erases up to 16 chips.	**£28**
ERASER GT – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened.	**£30**
Spare UV tubes.	**£9**

ANTI GLARE MONITOR SAFETY SCREEN

HEADACHES? TIRED EYES? Don't take pills – Use a Watford Electronics anti-glare filter!
- Made in Britain by a long established glass maker.

Available in 12" & 14" versions – please specify the exact monitor type when ordering.

Special Price: **£16.00** (carr. £1)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£9.50**

FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front.

Locks supplied with two keys. Price **£11** (£2 carr.)

DATA RECORDER

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.

£20

DATA CABLE to connect recorder to BBC **£2.50**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

DISC DRIVE POWER LEADS

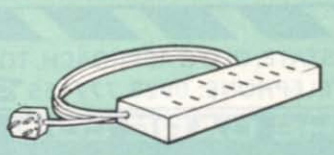
Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.99

ACCESS/VISA HOT LINE
0923 50234
24 Hours

VISA

ACORN SPEECH SYNTHESIZER

Speech Chips, Manual and full fitting instructions

Only £19

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28 pin ZIF SOCKET (Textool)	**£6.95**

28pin DIL PLUG

SOLDER type	**£2.90**
IDC CRIMP type	**£3**

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

8way DIP SWITCH	**£0.85**

CHIP SHOP

7438	**40p;**	74LS00	**30p**
74LS04	**25p;**	74LS10	**25p**
74LS123	**£1;**	74LS163	**70p**
74LS244	**95p;**	74LS245	**£1.60**
74LS393	**£1.20;**	4013	**60p**
4020	**£0.90**	4816	**£1.00**
LM324	**£0.45**	UPD7002	**£4.40**
6502A CPU	**£5.45**	65C02 CPU	**£9.50**
6522	**£3.40**	6845SP	**£7.50**
SAA5050	**£8.75**	SN76489	**£5.50**
2764-250nS	**£4.25**	27128-250nS	**£9.75**
6116LP-2K	**£3.25**	6264LP-8K	**£9.95**
8271	**£50**	ACORN DNFS	**£15**
ACORN OS 1.2	**£6**	ACORN BASIC 2	**£16**

SLEUTH ROM **£25** TOOLKIT ROM **£23**
BBC A to B Upgrade Kit **£45**

NEW LAUNCH

SPOIL-SPORT ROM

BANISH GAMES . . . DEVELOP BRAINS
Is it that all too often your BBC Micro is being used to stage intagalatic war? Would you rather it was put to a better use?
The answer is now simple. Fit a WATFORD SPOIL-SPORT ROM.

It will:
- Stop machine code games being played on your BBC MICRO.
- Promote serious BASIC programming.
- Allow you to 'UNLOCK' your micro only with a preprogrammed password (in ROM).
- Interface with both disc or tape based micros.

This ROM is ideal for SCHOOLS, COLLEGES, etc.

Only £20

(Please specify password required when ordering.)

COMING SOON

SIDEWAYS RAM/ROM BOARD

SENSATIONAL new launch from Watford – a RAM/ROM board to enhance the power of your BBC Micro even further!
NO SOLDERING REQUIRED – simply plugs into the CPU socket – NO FLYING LEADS.
Compatible with double density boards, our 32K RAM board, etc.

OUTSTANDING FEATURES include:
- Up to 128k sideways dynamic RAM in 16k steps (banks 0-7).
- 4 sideways ROMs (banks 12-15) in addition to those already in the BBC micro (banks 8-11).
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BATTLE FOR HARBOUR COMMAND

By GEOFF KEY

HARBOUR Command is a fast moving arcade game set in a small Cornish harbour during the last few months of the First World War. You are the harbour commander and have to defend it from the ravages of the Luftwaffe's latest aircraft.

Unfortunately you only have a Boer War cannon as armament and a piano accordian to pass the time.

On the plus side, you have an unlimited supply of cannon balls and an advanced video gunsight accidentally left behind by Doctor Who when he called in for a cup of tea a week last Wednesday.

This gives you a slightly better chance than none at all, though you appear to be doomed to lose in the end. Your only real hope is to gain a decent memorial on your gravestone.

On a serious note, the game is written for either joystick or keyboard and has four levels of play. For joystick you should use the left-hand stick which must also be of the analogue/linear type and not a switched one. For keyboard you use the following keys to move the sight and to fire:

<	**LEFT**
>	**RIGHT**
A	**UP**
Z	**DOWN**
Space	**FIRE**

After being asked which of the four levels of play you want and whether you require joystick or keyboard, there will be a short delay while the harbour scene is drawn, taking about ten seconds on a single processor. Then, following a burst of music, you will be attacked initially by solitary biplanes that divebomb the ships in your command.

If your aim proves to be good enough and you are not wiped out quickly, they will come in increasing numbers until you are.

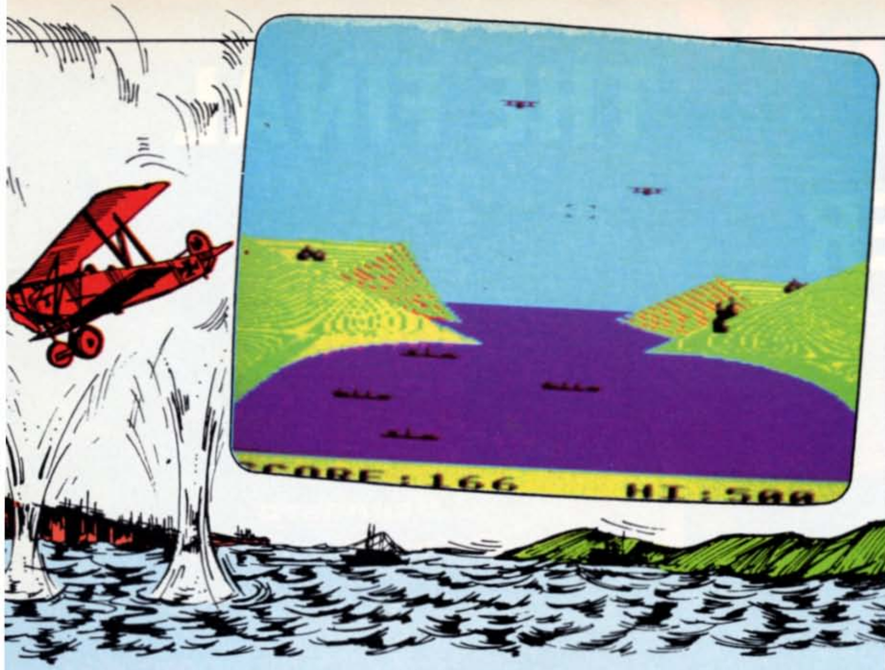
The speed of the planes and the accuracy needed to destroy one increases with each level of play. As the game has 3D graphics and sound the number of points you score for hitting a plane depends on how far away it is at

VARIABLES

B%	Cannon ball character number.
C%	Counter for cannon ball.
D%	Cannon fire flag.
F%	Number of surviving ships.
G%	Plane firing flag.
H%	Colour toggle for plane fire.
HS%	High score.
I%	Cannon sight character number.
J%	Joystick/keyboard flag.
L%	Number of planes.
M%	Level number * 4.
SC%	Current score.
T%	General purpose counter.
Q%	Counter for $&3000.
V%	Which plane is being moved.
X%	Cannon ball X coordinate.
XS%	Cannon ball X step value.
Y%	Cannon ball Y coordinate.
YS%	Cannon ball Y step value.
Z%	Sight X coordinate limiter.
SX%(3)	Ship X coordinate
SY%(3)	Ship Y ccordinate.
SHIP$(3)	Ship character strings.
I%	Limiter for L%.
m%	Value to decrement w%(V%) by.
mx%	Sight X coordinate memory
my%	Sight Y coordinate memory.
sc%	Value of score to bring in another plane.
x%	Sight X coordinate.
y%	Sight Y coordinate.
bx%(20)	Explosion plot X coordinates.
by%(20)	Explosion plot Y coordinates.
c%(2)	Counter for plane movement.
h%(2)	Plane horizontal step value.
p%(2)	Plane in flight flag.
s%(2)	Plane character number.
w%(2)	Delay counter.
x%(2)	Plane X coordinate.
y%(2)	Plane Y coordinate.
$&3000	String for final comment.

PROCEDURES

relocate	Relocates the program to page &E00 if required.
init	Initiates user defined characters, envelopes, dimensions the arrays and sets fixed variables.
vari	Sets variables to start values.
scene	Called by PROCvari, draws harbour.



the time. The greater the distance the harder the shot and the more points scored.

Pressing Escape at any time will return you to the instructions so that you can alter the level of play or the keyboard/joystick option.

The program runs in Mode 2 and is just over 7k in length, so if you have a disc drive the program will relocate itself to &E00 when first run.

This happens automatically and requires no loader program to do so. As it only takes a second or two to relocate you probably won't notice it happening. I would recommend therefore that you save the program before you run it.

Do not type in line 80 until the program is running correctly, as you could enter an infinite loop if there is an error in your typing, and Break will initialise the disc system, destroying all your efforts.

If you don't have discs you can omit line 40 and lines 22000 onwards and save yourself a bit of work.

inst	Instructions.
asc	Calls PROCinst if instructions are required then calls PROCj. This procedure is entered if Escape is pressed.
findj	Gets the level required and if joystick or keyboard then sets J% accordingly.
game	The main game.
joy	Joystick input.
key	Keyboard input.
move(V%)	Calculates where the planes are to move to.
where	Decides the start coordinates for a plane.
plane	Moves the planes.
fire	Moves the cannon ball.
decide	Calculates where the cannon ball is to be fired to and the relevant steps to do it.
peek	Checks for the presence of a plane at the final cannon ball coordinates.
bang(V%)	Plots the explosion if a plane is hit and also calls PROCmove to keep everything going.
score	Prints and updates the score.
end	Prints the final comments and score, then requests if another go is required.
7scn	Gives blue characters on a white background in Mode 7.
music	Plays Blow the Man Down at the start and end of the game.

Harbour Command listing

```
   10 REM **** Harbour  Command ****
   20 REM ****   by  G.J. Key   ****
   30 REM ****  (C) Micro User  ****
   40 IFPAGE>&1100PROCrelocate
   50 PROCinit
   60 MODE2:PROCtitle
   70 MODE7:PROCask
   80 ONERRORMODE7:PROCask
   90 REPEAT
  100 MODE2
  110 PROCvari
  120 PROCmusic
  130 PROCgame
  140 PROCmusic
  150 MODE7
  160 PROCend
  170 UNTILFALSE
 1000 DEFPROCgame
 1010 SOUND1,0,0,0:SOUND1,2,100,0
 1020 REPEAT
 1030 FORV%=FALSE TOL%
 1040 IFD%PROCfire
 1050 IFp%(V%)PROCwhere
 1060 PROCmove(V%)
 1070 NEXT
 1080 IFL%<l%ANDSC%>sc%L%=l%:l%=(l%+1
)AND2:sc%=sc%*2:m%=1+(32-M%*l%)DIV3
 1090 UNTILF%<FALSE
 1100 ENDPROC
 2000 DEFPROCmove(V%)
 2010 IFG%SOUND&10,1,4,10:VDU19,4,H%;
FALSE;:G%=G%+TRUE:H%=H%EOR5:IFG%=FALS
E GCOLFALSE,2:MOVESX%(F%)+RND(64),SY%
(F%):VDU252:IF(TIME AND3)>FALSE GCOLF
ALSE,4:MOVESX%(F%),SY%(F%):VDU251,251
:F%=F%+TRUE
 2020 IFADVAL-5SOUNDFALSE,-16+c%(V%)D
IV2,3,1
 2030 IFJ%PROCjoy ELSEPROCkey
 2040 IFx%<>mx%ORy%<>my%:GCOL3,3:MOVE
mx%,my%:VDUI%:MOVEx%,y%:VDUI%:mx%=x%:
my%=y%
 2050 IFNOTp%(V%)ANDw%(V%)<0PROCplane
 2060 IFc%(V%)=8ANDABSh%(V%)<4ANDG%=F
ALSE SOUND&12,3,255,10:G%=8:H%=1
 2070 w%(V%)=w%(V%)-m%
 2080 ENDPROC
 3000 DEFPROCjoy
 3010 x%=Z%-ADVAL1DIV268*5
 3020 y%=ADVAL2DIV256*4
 3030 IFNOTD%ANDADVAL0AND1 PROCdecide
 3040 ENDPROC
 4000 DEFPROCkey
 4010 IFINKEY(-103)x%=x%-16
 4020 IFINKEY(-104)x%=x%+16
```

Turn to Page 138

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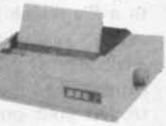

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RECOVER

RECOVER is a utility to recover programs which have been lost on disc. How many times have you used *WIPE and accidentally pressed Y in response to a file which is needed?

I bet you've done it more than once. The result is a lost file, and, of course, Murphy's Law dictates you've destroyed your one-and-only copy of the program.

RECOVER can also be used when the disc goes down. This occurs when *CAT (*.) fails to produce a directory listing, indicating a disc fault at the start of track 0. When this occurs, up to 31 files can be lost. For this reason backup discs should be made at regular intervals – don't forget to put a write protect tab on the source disc, just in case.

But good advice is meant to be ignored, so you'd better type in RECOVER and make a backup while you're at it.

With very little knowledge of disc formats, RECOVER can be used to extract programs from a disc even if the directory is corrupted.

Designed to work with single density disc formats as used by Watford and Acorn DFSs, it should also work with double density disc systems in the single density mode as long as they are using the Acorn format.

The standard Acorn format is:

40 or 80 tracks per disc surface numbered 0 to 39 or 0 to 79.

Ten sectors per track numbered 0 to 9.

256 bytes of data per sector.

From this you can see that each track holds 2,560 (256*10) bytes of data. Multiplying 2,560 by 40 or 80 will then give the capacity of one disc surface – 102,400 bytes for a 40 track disc or 204,800 bytes for an 80 track disc. In other words, you can store either 100k (100*1024) or 200k (200*1024) of data on each disc surface.

The DFS uses track 0, sectors 0 and 1, to hold the directory. This contains information about the files stored on the disc. It includes their name, length, start position and so on.

If any of this data is corrupted, the file may be lost. Unfortunately, out of all 40/80 tracks on the disc the most susceptible track is zero.

This is because it's always being updated when files are saved or deleted. So if your disc ever becomes faulty it will almost certainly be a fault on track zero. In many cases this is fatal.

The only way to read data from a disc when the directory has been destroyed is by using an OSWORD &7F call.

A standard model B micro without a DFS only recognises OSWORD, &FFF1, calls from 0 to 13. Any unrecognised OSWORD – and OSBYTE – calls are passed to all of the sideways ROMs present. This allows the sideways ROMs to have one of their own unique commands. In the case of OSWORD &7F the DFS accepts the command and processes it accordingly.

In fact, OSWORD &7F allows you to send commands to the 8271 floppy disc controller. Sending the correct sequence of commands makes it possible to access data from any undamaged sections of a disc.

Like all other OSWORD calls, information is passed by using a control block. This block is pointed to by the X and Y registers – X contains the least significant byte of the block address and Y contains the most significant byte of the block address.

```
base+0     = Drive number
base+1 ┐
base+2 │
       ├ = Buffer address
base+3 │
base+4 ┘
base+5     = Number of parameters (n)
base+6     = The command type
base+7     = parameter 1
base+8     = parameter 2
......     . .......... .
base+n+7   = result
```

Figure I: OSWORD &7F control block

The OSWORD &7F control block is shown in Figure I.

The drive number indicates which drive is being used. This will nearly always be 0.

The buffer address corresponds to a section of memory where data to be read/written from/to the disc is to be stored/found.

The number of parameters specifies the number of extra bytes needed to complete the command.

The command byte is the command number written to the FDC. This can be a command to read from the disc, write to it, verify the disc, format the disc and so on.

The next bytes are the additional parameters needed to complete the command. These usually correspond to the track address, sector start and number/size of the sectors being accessed.

The final byte indicates the result of the OSWORD call. Any number other than zero indicates an error. This number is the one printed after the "Disc fault" error message.

Figure II lists the possible errors that can occur.

Right, now back to RECOVER. Type in the listing and save it – several times. Now run the program. This will assemble the routine from &900 onwards. The object code should now be saved by entering:

```
*SAVE "RECOBJ" FFFF0900 FFFF0C40
```

RECOVER can now be executed by entering either:

```
CALL&900
```

or

```
*RUN "RECOBJ"
```

CALL&900 will only work if the source program has just been RUN. You should also note that pressing Break corrupts part of the object code.

Once the routine is executed, the micro changes to Mode 7 and reads in sector 0 from track 0. The first &B0 bytes of the sector are now displayed on the screen in a hex dump format – all 256 bytes of the sector will not fit on the screen.

If the directory of the disc is corrupted – sectors 0 and 1 of track 0 – an error message will be displayed on the second line of the screen. See Figure II for a list of error numbers.

Error number in hex	Error meaning
08	Clock error
0A	Late DMA
0C	ID CRC
0E	Data CRC
10	Drive not ready
12	Disc write protected
14	Track 0 not found
16	Write fault
18	Sector not found

Figure II: Disc errors

Now you must locate the start of the program that you wish to recover. This is simplified by the fact that all Basic programs begin with the byte &D (carriage return) and all programs are stored at the start of a new sector.

This means that all we need to do is locate an &D byte at the start of a sector and read in as many sectors as possible from the start sector.

Hopefully, if the program hasn't been corrupted on the disc we will have recovered the lost file.

The hex dump allows you to see the character contents of the start of the sector. For this reason it is advisable to put a couple of REM lines at the start of all your programs indicating the name of the file and the date when it was saved. This will ease the recovery of specific files.

There are cases when an &D byte will be at the start of a sector even though it isn't the start of a Basic program. This can occur when a data or text file has been saved which contains &D bytes. This is another reason why REMs should be put at the start of your

→

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4 How many chips make up the BBC B+'s 64k of RAM?

5 Is the result of 3 EOR 3 TRUE or FALSE?

6 What is the largest positive number an integer variable can represent?

7 Which bit of the 6502 status register is unused?

8 In which order are the high and low bytes of the return address pushed on the stack when JSR is executed?

9 Whose name is in the Basic II ROM?

10 What is the maximum number of envelopes that can be defined?

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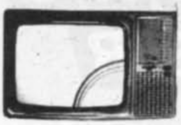

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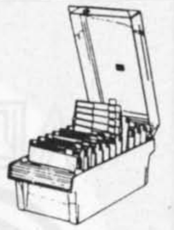

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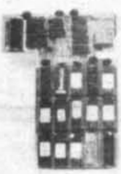

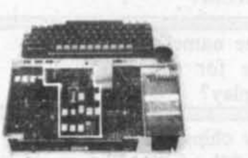

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BBC

From Page 65

programs – so you can identify the file as Basic.

Another case when the &D byte can be misleading is when the start of a sector coincides with the start of a new Basic line.

You see, the start of a new line in a Basic program is indicated by an &D byte. This means there is a chance that the end section of a program has been found instead of the start.

If you know that all of your programs start at line 10 the first three bytes of the start sector will always be:

```
0D 00 0A
```

To ease the use of RECOVER, the commands are executed by pressing a single key. Figure III lists the commands available.

Here's how to use RECOVER.

First, find the start of a program. This can be done by either pressing f0 or using the cursors arrows to move between sectors.

If f0 is pressed, RECOVER will automatically begin searching through the disc from the current position until it either reaches the end of the disc or it finds an &D byte at the start of a sector. If the latter is the case, the scan will stop. Now you can either RECOVER the file or continue the scan by pressing f0 again.

The searching mode can be stopped by pressing the S key. This should be used at the end of the disc when the sectors are full of &E5 bytes, indicating that the rest of the disc hasn't been used.

When you are satisfied that the start of a program has been found, you can RECOVER it by pressing the Tab key. As soon as this is done, RECOVER will load the file into memory and return back to Basic. The recovered file should now be saved on several discs.

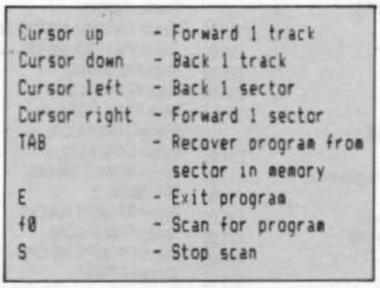
It's also possible to recover data and text files. To do this you must first find the start of the file and then press Tab to copy it into memory. Now the memory contents must be saved with:

```
*SAVE "DATA" FFFF1900 + NNNN
```

where NNNN is the length of the file in hexadecimal. As you can see, recovering data files is much harder because the length is unknown, unlike with Basic programs where the end of the program can be found by examining TOP.

At present RECOVER will only examine 40 track discs in drive 0, but this can be changed so that an 80 track disc can be examined in any drive – see lines 50 and 60.

The default setting for the restore page, where the program is RECOVERed to in memory, is &19, since this is the default value for PAGE on disc machines. Again, this can be changed by altering line 70.



```
Cursor up      - Forward 1 track
Cursor down    - Back 1 track
Cursor left    - Back 1 sector
Cursor right   - Forward 1 sector
TAB            - Recover program from
                 sector in memory
E              - Exit program
f0             - Scan for program
S              - Stop scan
```

Figure III: Command summary

Turn to Page 136

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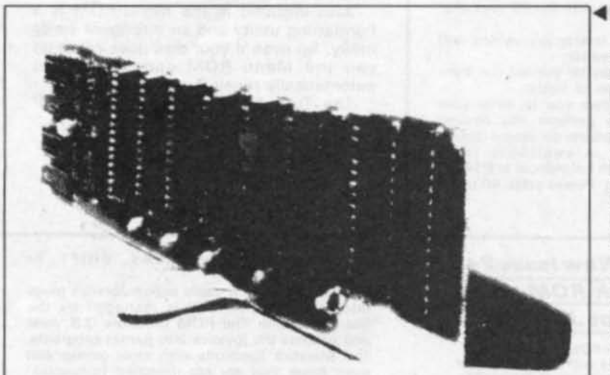

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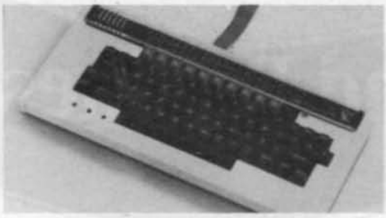

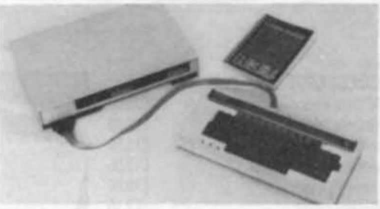

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DisCat is easy to use and makes printing labels for your discs the simplest of tasks. Create labels for your whole collection of discs or just for one.

Additional information shows you the size of the disc (40 or 80 track, single or double density) and the amount of space used. Each disc is tagged with a volume number for easy identification. There is room for a comment on the label plus the date catalogued and the number of files present on the disc.

As each disc is catalogued you are given the opportunity not only to add comments to the disc label but to also make comments beside each file held on the disc. DisCat's built in database provides full database facilities allowing the resulting information to be searched for any filename or reference.

DisCat uses standard sized labels and comes with 50 labels to get you going. Plus a comprehensive manual.

DisCat – £14.95

Microtest List Manager

A Data Filing System for the BBC Microcomputer

A disc-based database for the BBC model B on disc that is both sophisticated yet easy to use. LIST MANAGER has been specifically designed to introduce the newcomer to the concept of databases with friendly menus, command prompts, data entry and editing routines. With the aid of comprehensive and comprehensible documentation, the user is encouraged to make the most of the BBC's disc storage system and LIST MANAGER's data handling powers. Software features include the following:

(a) Records automatically sorted alphabetically as they are entered, and may subsequently be retrieved in their file sequence or alphabetically without need for slow sorting routines;

(b) Records may be up to 255 characters long, contain up to 255 fields, and need not be restricted to the size of the screen;

(c) Existing files may be restructured to increase or decrease particular field lengths, delete unwanted fields or even introduce entirely new ones, allowing you to completely reformat your file at any time;

(d) File size is limited only by disc capacity relative to chosen record length, permitting a typical file to contain between 1000 and 2500 records, or twice as many with the 80 track disc drive;

(e) Powerful search facility is provided and also a very friendly file editor;

(f) Address labels may be printed out from files, using your selection of fields.

(g) 'User option' allows you to write your own Basic routines to perform any desired calculations or manipulations on stored data.

LIST MANAGER is available from MICROTEST on disc with full manual at **£14.95** inc postage and packing. Please state 40 or 80 track when ordering.

Disc Menu ROM

The MICROTEST DISC MENU ROM has been designed to alleviate problems caused by multiple disc files and has been created especially for those with little time and a lot of trouble on their hands (e.g. teachers).

THE OLD METHOD – When you have a disc of say 31 programs isn't it time consuming and frustrating to catalogue and select the file you require from disc? Even after all of that, you then have to load it.

All that's now been superseded thank goodness.

THE NEW METHOD – Take your disc and place it in the drive of your choice (it does not have to be drive 0). Now instead of SHIFT-BREAK you boot the disc with 0-BREAK for drive 0, 1-BREAK for drive 1, 3-BREAK for drive 3 etc. The disc then provides you with a Menu from which you choose the corresponding letter/program. Press that letter and you're off.

Something that could have taken you a couple of minutes now can be done in as little as five seconds.

Also included in the Menu ROM is a Formatting utility and an intelligent verify utility. So even if your disc does crash on you the Menu ROM can now try to automatically repair it after verifying.

The Disc Menu ROM. **£12.95** P&P £1.00

TUBE is a registered trade mark of ACORN COMPUTERS LTD. Screen shot is 'ELITE' by kind permission of ACORNSOFT LTD.

MICROTEST LIMITED

18 Normandy Way, Bodmin,
Cornwall PL31 1EX
Tel: 0208 3812. Bulletin board
(Prestel compatible) 0208 77677.
Dealer and Export Enquiries Welcome

It's here, the New Issue 2+ Starstick ROM & Quickshot Joystick

Picture shows Starstick ROM, Patchlead and Quickshot Joystick (along with Acornsoft's Elite Package – by kind permission of Acornsoft)

This new release of the very popular Starstick & Quickshot programmable joystick offers new possibilities. Over 30 extra commands which include: *Elite, *Replica, *Sneaky, *Plonk, *Adval, *Prop, *Kill, *Revive, *Reset, *Repeat, *Map, *Ksave, *Kload, *Cursor and *Stick.

Fully help driven format with 20 page manual including full fitting instructions.

Not only is the package fully programmable, but it's response time is also user variable. Thus giving YOU the ability to tailor the joystick to YOUR requirements, as only YOU can.

The new issue software is fully compatible with Disc versions of Acornsoft's 'Elite', Acornsoft's 'Aviator' and Clares 'Replica'. It features relocatable workspace to enable it to work with many of the few games it would not work with before. As in the previous issue, the Starstick ROM is fully 'TUBE' compatible.

Specifically designed with the Disc user in mind, the software is not affected by any combination of the BREAK, SHIFT, or CONTROL keys.

The self centring, rapid action Joystick plugs into the user port and is managed by the Starstick ROM. The ROM monitors O.S. calls and patches the joystick into games programs. The Starstick functions with most games and even those that are not designed to function with joysticks. IT IS VERY IMPORTANT HOWEVER THAT THE GAMES USE LEGAL OPERATING SYSTEM CALLS AS MOST DO.

The New prices are:

Starstick ROM (version 2+) and Quickshot II	**£29.50**
Starstick ROM (version 2+) and Patch lead	**£25.30**
Starstick ROM (version 2+)	**£19.55**
Starstick ROM Reprogramming Charge	**£5.50**

The Patch lead option allows you to plug any ATARI/SPECTRUM Style joystick into the BBC computer with the STARSTICK ROM.

PLEASE INCLUDE £1.00 for CARRIAGE and packing.

Also included in the package is a powerful ROM Manager to enable you to 'KILL' (temporarily) any ROMs that might cause you problems.

All commands in MICROTEST ROMs can be prefixed by 'M' should any other ROM try to intercept the same command name.

Your personal passport to the world of communications with **TELECOM GOLD**

Telecom Gold is a trademark of British Telecommunications plc

What it offers the BBC Micro user...

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe. You can set up your own computerised filing systems, store and update statistics and other information, cross-reference material between files, selectively extract the information you want, perform massive calculations and design reports to display information from any of the files and in any format you choose.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 96 per cent of MicoLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages – at a third of the cost

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sunday). The service was intended for people phoning their message to the operator, and it costs £3.50 for 50 words. But you can now use it via MicroLink for only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are ... home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, tele-messages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 10.5p per minute or part – standard rate.

Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.

Applicable for storage of information, such a telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.

Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2p per minute or part (300 baud); 2.5p per minute or part (1200/75 baud).

Only applies to users outside the 01- London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 16.5p per 100 (N. America); £1.15 per 400 (Rest of world); £2.75 per 400 (Ships at sea).

Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Radiopaging: No charge.

If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

MicroLink

in association with

TELECOM GOLD*

Application Form

I/We hereby apply to join MicroLink

(✓) ☐ I enclose my cheque for £5 payable to Database Publications as registration fee to MicroLink.

(✓) ☐ I also wish to use Telex. I authorise you to charge an additional £10 to my initial bill for validation.

☐ I confirm that I am over 18 years of age.

Signature ______________________

Date ______________________

I intend to use the following computer ______________________

FOR OFFICE USE ONLY:

Mailbox assigned ______________________

Start date ______________________

Password ______________________

SEND TO:
MicroLink
Database Publications
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.

Name

Position

Company

Address

Postcode

Daytime telephone

Commencement of Service
Please indicate month of commencement
Allow 10 days for validation of mailbox

☐☐ 19 ☐☐

Payment

Whilst Database Publications Ltd is the supplier of all the services to you, the commission and billing thereof will be handled by Telecom Gold as agents for Database Publications Ltd. Date of first payment to be on 15th of month following commencement. Please complete billing authorisation form A, B or C below:

A. Direct Debiting Mandate *(Enter full postal address of Bank Branch)*

To

I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD by Direct Debit. Bills are issued 10 days before debit is processed.

Name of Account to be debited

Account Number

B. Please debit my/our Access/Visa account number

I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD. Bills are issued 10 days before charge is applied to your account.

C. Please invoice the company/authority.

(✓) ☐ If you select this option, which is ONLY AVAILABLE to government establishments and public limited companies, you will be sent an authorisation form for completion which will require an official order number to accept unspecified amounts.

* *Telecom Gold is a trademark of British Telecommunications plc.*

The RAF had gremlins, too

IT really is a pity that when Betasoft put **Battle of Britain** on to disc it didn't take the opportunity that discs provide for enhancing any game.

With the flexibility of disc access, you can use overlay techniques to – at least partially – overcome the BBC Micro's limited memory.

Instead, Betasoft seems to have simply transferred the cassette version.

Even with eight files of instruction and five files of spurious logbook information, the complete offering is only 52k long.

The disc isn't even dual formatted, but it is a simple matter to transfer the files from the supplied 80T disc to 40T, for the game isn't protected.

Booting the disc presents you with a logo, quickly followed by a request for your name. This lends that personal touch when you are told you're dead!

Then, once you've stated you are either a beginner, or advanced, a menu offers a choice of practising individual parts of a mission, or flying a full sortie.

From maximum readiness, the scramble comes. Ignition sets the mighty Merlin into action, and an irritating buzzing hum belies all that notional horsepower.

BETASOFT
presents
BATTLE OF BRITAIN
for BBC 32K Model B

By following the vector information which flashes at the top of the screen, eventually an armada of German aircraft is seen in the far distance.

Here comes the gremlin. For if you have either type of Acorn DFS the screen freezes.

However, a Watford DFS will chain in the air battle, and a bewildering array of aircraft prove remarkably difficult to hit, while enemy fighters (you can see them in the rear mirror with their gun ports flashing) seem to have no such problem.

It is possible to shoot down friendlies, which will do your score no good at all. You might now begin to wish you'd spent more time on the instructions, learning which silhouette was which.

Eventually, ammunition exhausted, steering information flashes back on the screen, and you return to base.

After some practice, and always remembering to lower the undercarriage, you have the opportunity to update your logbook on landing.

It is possible to take on the personna of a famous fighter ace, and several logbooks are available for this sort of impersonation.

However, it is doubtful if any of them would recognise the machine that they supposedly flew.

It is unforgivable to offer a flight simulator with only keyboard controls – there isn't a joystick option!

In the same vein, there is only the remotest connection between altitude, power, angle of climb, angle of bank, airspeed, stalling speed, and, of course, weight (as the sortie progresses). Let no one imagine any aeroplane really flies like this.

Worse, perhaps, in combat fighter pilots are taught to point their aircraft at the enemy.

Here, pressing the keys gives the impression that the enemy is being moved – it's an unexciting impression.

It's unfair, but true, that Acornsoft has set the shoot-'em-up flying standard with Aviator. This Spitfire does not compute.

Robert Elwell

Beeline can wear you out

ON first inspection, **Beeline** from Robico Software, seems to have everything going for it.

The aim of the game is to guide a blue bee called Hank through a series of mazes to his

→

A SOFT TOUCH FOR TYPISTS

TYPING Tutor, from Pitmansoft, is a much easier way of teaching yourself to type than following the more-conventional textbook.

Suitable for absolute beginners or people just wanting to brush up their typing, the disc-based program is simple to follow and the exercises are carefully graded.

You start by doing the drill exercises.

A diagram of the keyboard is displayed on the screen and the cursor flashes underneath the key you should press.

You must keep your eyes on the screen all the time, never on the computer. If you strike the correct key, the cursor moves on to another letter and so it goes on until you have finished that drill.

If you strike the wrong key, you will hear a beep and the cursor will not move until you find the right one.

After each drill there are graded practice exercises using the keys just learnt. These are just words or sentences which you copy.

At the end of each practice exercise – and also the test passages which you come to later – your accuracy and speed are recorded at the bottom of the screen.

If your accuracy is below 90 per cent in the easy exercises and 95 per cent on the others, you have the option of practising the words which you typed in incorrectly or else repeating the whole exercise.

You do not go on to the next exercise or drill until you score at least 90 per cent or 95 per cent accuracy, and you should aim for a speed of at least 20 words a minute.

However by pressing Esc + M at any time you can return to the menu, which displays the contents of each drill and exercise passage.

By pressing the appropriate number you can choose which one you want to type next. The program is well thought out and there are enough practice exercises and test passages to make it varied.

There are clear instructions given on the screen as and when you need them.

The carefully-graded series of exercises maintain motivation throughout.

The immediacy of the feedback adds greatly to its effectiveness and gives you the incentive to pass your personal best.

It's hard to find fault with Typing Tutor. The program has certainly proved successful for me – now I can type.

Carole Sillers

From Page 73

hive. He expends energy rather quickly, and explodes when he gets too tired, but you can refresh him by picking up pollen, apples, flowers or honey on the way.

As usual, various nasties try to stop him – spiders, insecticide cans, toadstools, and bee-eating lizards.

Quite an interesting game, one would think, and indeed the graphics are excellent, making very good use of the BBC's colour.

Also, there are no less than 18 screens to fly through, including a practice screen to give you a feel of the controls.

So, with all this, why should I dislike Beeline as much as I do?

Mainly because the game made me so angry that I wanted to go out into the garden and bury it under six feet of soil.

You see, the game has what you might call built-in gravity. Hank falls rapidly back to earth, and to keep him airborne, you have to press the Shift key.

Unfortunately, he also explodes when he gets angry, and he gets angry when he bumps into walls, ceilings, or even rests on the ground.

This means that you are continuously hammering the Shift key to stop him blowing up with anger, yet trying not to hammer it too much, in case he blows up with exhaustion.

With practice, it's probably possible to strike a happy medium, and have Hank tearing around like a five-year-old. However, I found the game so difficult that my average go lasted about two minutes.

After an hour's playtesting, I was showing no improvement, and was so cross that my cat now has permanent scars.

Of course, you may think differently and love the game. But for me, Beeline has to go, before my cat packs up and leaves for good.

James Bibby

sub strike
TDS

Space war takes a dive

SUB STRIKE from Tomorrows Dream Software represents a departure from their usual line of utilities, into the games field.

It involves controlling a submarine that can move in all directions, armed with the usual missile-launcher. Above you patrol your targets – a fleet of helicopters bent on your destruction, four waves for each level.

They drop never-ending barrages of bombs, homing rockets, and if you can destroy them, even their own wreckage becomes a sea-bound missile.

Later stages involve the addition of homing rockets which fortunately can be shot, and helicopters moving in all directions which makes them near-impossible to hit.

Other sonar submarines and a continuously rising sea floor restrict your movement through the water.

This all goes to make your existence that much more unlikely as you attempt to score points by destroying anything that moves.

The game starts off fairly quietly, with not too much happening, but if you linger too long on each sheet, waves of mines start to cross the screen – a dangerous reminder to hurry up.

By stage 1 of level 2, all the features have come into play and it is very difficult to stay alive.

Sub Strike has all the standard features – a high-score table, redefinition of all movement keys, joystick and sound on/off options.

The program amounts to a fairly ordinary Space Invader-type game. The sound is nothing special and the movement of the small, often-flickering graphics characters, is not very smooth.

Is it worth buying? Well, try it out first if you can – you may find you like it. I'm afraid I tired of the game very quickly.

Peter Clifton

Not the best of crops

THERE is a certain sensation of warm nostalgia about **Market Gardener**, from W.W. Electronics, recollecting as it does visions of that archaic Sumeria game of the day when we were all younger, sweeter and micro-free.

However, despite the odd moments of satisfaction, it is difficult to envisage many parting with hard-earned cash – albeit just £3.50 – to savour the delights of horticultural management.

There are no audible or graphic effects to supplement the game, merely a constant text-only Mode 7 display. I'm afraid that only a top-drawer Adventure can get away with that in this age.

The game lasts for five years – that's the game, not real time.

In each Spring period, the gardener must decide which crop to cultivate in each of his three land plots and whether to add fertiliser or not.

There are no quantities involved at all – merely three straight five-way choices between planting potatoes, carrots, runner beans, cabbages or leaving a field fallow.

Hereafter emerges a major drawback – there is precious little subsequent player participation, save a few token decisions during the Winter period, such as whether to purchase manure or have the land appraised.

There is a variety of descriptive pieces regarding Summer climate, disruption by pests and their effects on annual yields.

These are generally informative and well thought out, but have obvious limitations. A few games exhaust the repertoire – particularly as the passages are all cut and dried rather than being created by the amalgamation of different sentences.

So I have to give the old thumbs-down for this offering – its tidy layout is cancelled out by the lack of a quantitive aspect and the idea of a long-term strategy.

Vijay Sundaram

Fun down the drains

IN **Drain Mania**, the latest release from Icon Software, you play the part of Theodore, a very athletic head-banger who loves to explore the local drain system.

Your aim is to collect coins that are dropped from above, and eventually escape. While doing this you are hampered by three creatures, Inky, Pinky and Dinky, and various other nasties.

To start, there's a nice set of scrolling instructions accompanied by some cheerful music.

This is followed by a menu to define your movement keys before the main game loads, still with the interrupt driven music playing.

There is an option to turn it off and you'll only leave it on once, believe me.

The idea is to kill all the creatures on each screen in order to progress to the next.

To do this, you position yourself on the level beneath them and jump up, dislodging one of the flexible slabs.

Depending on the creature – Dinky needs three hits, Pinky needs two, and Inky only one – this stuns them, and you have a short time to run over them while they are defenceless.

If you are too slow, they recover but are even more powerful.

Eventually, when you accumulate enough points, you get a bonus screen of coins to be collected before a timer runs out.

Then it's on to a slightly different level for more Inkies, Pinkies and Dinkies and their deadly sidekicks the water-drop and the fire-ball.

On the whole I quite like the game. It has large colourful sprites and there are some nice touches that make it a little different.

Peter Clifton

AMX MOUSE

ULTIMATE GRAPHICS FOR THE BBC MICRO MODEL B

New!

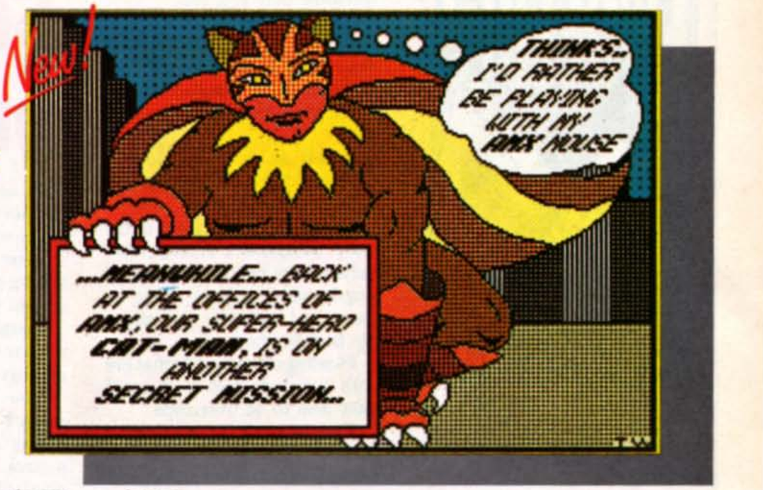
AMX PAINT POT

DISC ONLY £14·95 INC VAT

Finalist for Peripheral of the Year...that's how successful the AMX MOUSE is. Supplied as a package with the superb ICON DESIGNER and AMX ART programs, it has proved enormously popular. Not to mention the recently launched AMX UTILITIES and AMX DESK. And now Advanced Memory Systems brings you an exciting new addition to the AMX software range – AMX PAINT POT!

PAINT POT lets you fill in with colour any pictures you've made with AMX ART. Now you can bring your drawings to life with rich, vibrant colours. And with a palette of 256 different shades, you certainly won't be short of inspiration! The software even includes eight exciting pictures to start you off.

There' more, too. You can store up to twenty coloured illustrations in 'Picture Show' mode, which will then display your works of art in sequence, automatically or manually at the touch of a MOUSE button.


THINKS.. I'D RATHER BE PLAYING WITH MY AMX MOUSE
...MEANWHILE.... BACK AT THE OFFICES OF AMX, OUR SUPER-HERO CAT-MAN, IS ON ANOTHER SECRET MISSION..

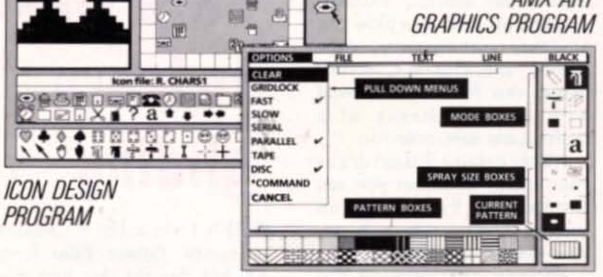
It's brand new...it's educational...and it's great fun! Don't miss this quality product from AMS; avoid the rush by ordering NOW.

AMX MOUSE PACKAGE

£89·95 INC VAT

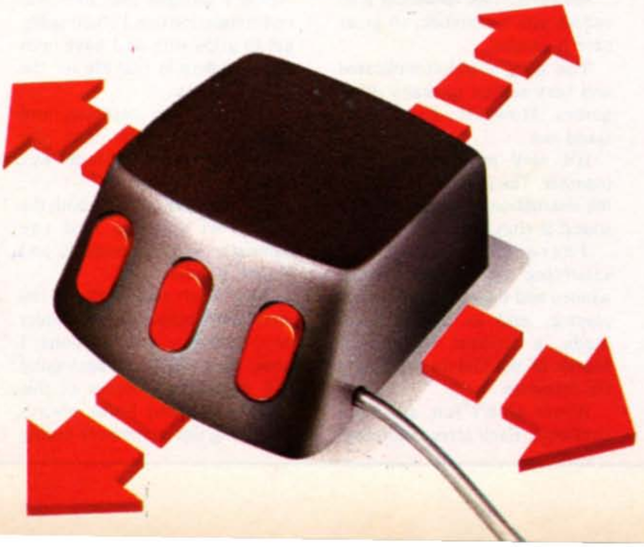
Got your MOUSE yet? This amazing opto-mechanical device brings facilities once only available on the most expensive computers. Use it with any Model B fitted with the Operating System 1.2. It's compatible with the 6502 second processor, and disc or tape filing systems. Great for Wordwise + and View.

Also included are two superb graphics programs: AMX ART, which makes full use of windows, icons, menus & pointers; and ICON DESIGNER, for creating and storing icons for use in your own programs. The complete AMX MOUSE package includes Disc, Cassette, Two manuals, EPROM and of course the MOUSE.


Icon No. 23
Load/Save
Icon file: R. CHARS1
OPTIONS
FILE
TEXT
LINE
BLACK
CLEAR
GRIDLOCK
FAST ✓
SLOW
SERIAL
PARALLEL ✓
TAPE
DISC ✓
*COMMAND
CANCEL
PULL DOWN MENUS
MODE BOXES
SPRAY SIZE BOXES
PATTERN BOXES
CURRENT PATTERN

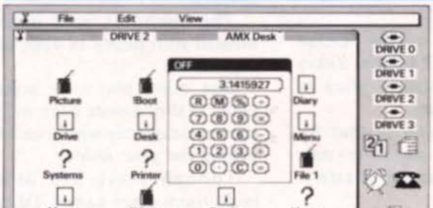
AMX ART GRAPHICS PROGRAM

ICON DESIGN PROGRAM



AMX DESK

DISC ONLY £24·95 INC VAT

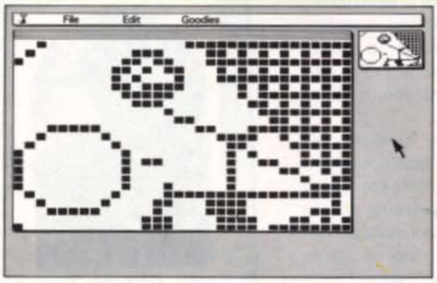

File
Edit
View
DRIVE 2
AMX Desk
OFF
3.1415927
Picture
!Boot
Diary
Drive
Desk
Menu
Systems
Printer
File 1
Memo
Xdump
Combo
Mouse
DRIVE 0
DRIVE 1
DRIVE 2
DRIVE 3

DIARY
ALARM
MEMO PAD
CALCULATOR
ADDRESS BOOK
TELEPHONE BOOK

Get organised at home or in the office with AMX DESK. Main screen shows a desktop with header offering SYSTEM, FILE, EDIT and additional menus. Point your MOUSE to select these invaluable aids: MEMO-PAD for up to 3 pages of text, TELEPHONE/ADDRESS BOOK with 200 or 400 scrolling entries, DIARY with 3 months' calendar, or ALARM to remind you of appointments. And bring a full-function CALCULATOR on-screen at any time. Any window can be dumped to your printer at the touch of a button. You'll wonder how you ever managed without DESK!

AMX UTILITIES

DISC ONLY £14·95 INC VAT


File
Edit
Goodies

ZOOM
ICON USER
ROTATE/REFLECT
PATTERN DESIGNER

AMX UTILITIES is another excellent program with a host of graphics features. There's a zoom facility for accurate amendments to your drawings: one dot becomes a character. You can also move, copy, rotate and reflect; enhance circles; draw ellipses and arcs; and print icons. Borders can be added, and pictures stripped and centred for saving and printing.

All these exciting products are available from good computer dealers. Or POST-FREE from Advanced Memory Systems Ltd, Green Lane, Appleton, Warrington WA4 5NG. Please send cheque or PO. For instant ACCESS or VISA orders, Ring (0925) 62907/602690.

EWGEEBEZ
SOFTWARE PROJECTS
32K BBC MICRO

A better class of maze

IN **Ewgeebez**, a new release from Software Projects, Zelob the Melkon (that's you) is trapped in a maze.

The good news is that by finding the 12 power crystals you will be teleported to safety. Great!

But the bad news is quite bad – not only will the space station's robots be out to KO you, but the neighbouring alien heavies are out to make it a free-for-all.

They teleport in frequently to have a quick shot at you . . . and fearsome they are, too.

Ranging from gnashing teeth to spindly insects, they all have one target! That's right – YOU!

It's actually another sprite-based game, but it really is fun to play.

Zelob is a fishy-looking character but carries a nice line in laser cannons.

As for the aliens, some of the more imaginative among them radiate laser beams of changing length, and you have to nip in, shoot and hit while the beams are at their shortest.

Floating robot guards that fire both forwards and backwards have also to be overcome.

The screen serves as a window looking down on the maze. If you follow a passage off the screen, the window moves with you.

The graphics are nicely detailed and the maze is shaded in many weird and wonderful colours.

The sound is well implemented with plenty of zaps and explosions.

One other plus is a screen photo in the cassette inlay which shows you exactly what you'll be getting for your money.

Though there are other multi-room maze games, I'd put this one high on my list due to its simplicity and polished appearance.

Verdict – Good clean family fun.

Nick Philips

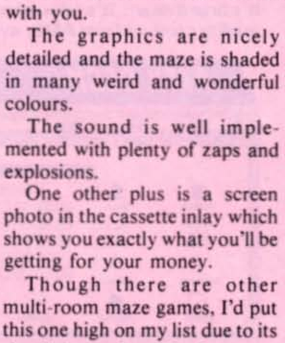
Cheapo video

THE Other Side of Heaven, by the New Wave group Kissing the Pink, is now available on a cassette tape with a difference.

It is one of the first examples of a new concept in home entertainment which I'd call CALIST, or Computer-Assisted Listening.

Appropriately enough, the other side of the tape contains a computer visual program, which you run while listening to the music. Or you can record both sides on a VTR, and so create your own cheapo video.

Garish abstract forms move rather jerkily around the screen, and if you manage to synchronise program and music – no mean feat – faces open and close their mouths like goldfish, in time with the lyrics.



All I can add is that if we're going to be invaded by CALIST packages, then I hope both the technical and creative quality of the graphics improves.

Gabriel Jacobs

Second thoughts prove better

I'VE always prided myself on my ability to recognise a good game when I see one.

After a couple of plays, I can tell if a game is going to be a dud or not. Or so I thought.

Estra, by Firebird, has proved me wrong – and I feel I owe an apology to the programmer.

You see, after a couple of games I thought "boring, boring", and put it to one side for a week. Now, having given it a good playtesting, I've changed my mind. It's excellent.

The theory behind the game is as follows. The sacred statue of Estra, the Snake God, has been stolen, and broken into 24 pieces.

These are strewn around the edge of the screen, and your job is to collect them and transport them one at a time to a safe area at the centre of the screen where they are automatically reassembled.

Of course, you have to avoid various baddies while doing this – Niodis, which are randomly-moving flashing diamonds that explode on contact, Escorils, small purple blobs that blow you up if they reach the centre of the screen, and Gosrads, yellow nasties that follow you around with the persistence of a professional debt-collector.

All the dashing around drains your energy level, but you can restore this by picking up supplies from inside a horseshoe-shaped forcefield.

However, this forcefield also causes you to explode, so great care is needed.

This may sound complicated and very similar to many other games. However, Estra does stand out.

It's very professionally put together. The graphics are good, the instructions concise, and the sound is truly excellent.

There are all sorts of satisfying explosions, thuds, whines and burps while you are playing, and as the program loads, a strident version of March of the Gladiators rattles the furniture.

BBC MICRO B
ESTRA
FIREBIRD

Above all it's fun, and it's a challenge. Each screen increases in difficulty, and despite a concentrated attempt last night, I still haven't completed screen three.

So, if you're scanning these reviews looking for an interesting game, try Estra. You won't be disappointed.

James Bibby

Safe way to learn gliding

WHEN I was asked if I wanted to review **Glider Pilot** from Apex, I thought that here was one simulation that I could really get to grips with as I have been flying gliders in real life for the last ten years.

Available on cassette, and both 3in and 5¼in discs, the simulation supports both key and joystick control.

A full introduction to both the world of gliding and the simulator itself is available and should be read.

The final page before the simulation begins is a reminder of the various key functions. I hope that the sales packaging will contain a printout of this page as I found I was always forgetting the commands during games. The objective in Glider Pilot is to fly for as long and as far as possible, points being awarded to provide competition.

During the flight the view ahead includes the instrumentation, with variometer – which gives the vertical speed of the glider – air speed indicator and altimeter.

In addition indications of spoiler, pitch, inversion and control positions are given.

After the launch – towed by cable along a runway – in which you gain as much height as possible, you are released. Now you need to find a thermal – a pocket of rising air – in which to gain height so that you can continue your flight.

The distance to the next thermal is given – how I wish real gliders provided such information – but not the direction.

If you find it, you circle in it gaining height before progressing to the next thermal.

A map is available and beacons can be rounded during flight to gain further points.

At the end of the flight a landing is required and, like the real thing, it is possible to land away from the runway although more points are available for landing back at base.

I was surprised at the difficulty I had in flying the simulator to begin with, although I quickly learned to at least stay airborne. After several hours it is still demanding and I find it difficult to score high points.

A friend of mine, a newcomer to flying, has learnt more slowly than I, but now flies the simulator better.

Maybe this reflects the differences between simulation and reality.

Although not as difficult as, say, Elite, Glider Pilot is a good package and a good introduction to gliding.

Ian Whitmore

No prize for that tape...

BRIAN Jacks' Superstar Challenge, from Martech, is a series of games in the Micro Olympics style.

You compete against Brian Jacks, judo and TV Superstars champion, in eight events – swimming, canoeing, archery, cycling, 100-metre sprint, arm dips, squat thrusts and football.

You start on level 1. Accumulate more points than B.J. over the eight events and you proceed automatically to the next level.

The scores do no re-zero at the start of each level, so it is possible to obtain a large enough lead in the early levels to enable you to stay in front until you have completed level 8 (the highest), after which you find yourself back on level 1, and round you go again.

BRIAN JACKS
SUPERSTAR
Challenge
BBC 'B' / ELECTRON
martech

Archery and football are the only events which rely mainly on skill and judgment. To do well in the other events you need to be adept at flicking the Z and X keys or waggling the joystick from side to side.

So much for the software. The cassette comes in a nice plastic case which closes securely and little fingers will have great difficulty opening it – a definite plus if there is an inquisitive toddler in the house.

The instruction sheet includes instructions for the Commodore 64 and the Spectrum (am I allowed to mention them in your magazine, Mr Editor?) as well as the Electron and the BBC B. The introduction says: "The instructions have been kept to a minimum" – frankly, I think they are inadequate.

The biggest problem with this program was the tape itself.

This has the Electron version on one side and that for the BBC (the one we tested) on the other, so you have no back-up.

The first time we tried it with CH."" it loaded perfectly apart from one block which went in at the second attempt.

The only other time we managed to get it in from the original tape I had to sit there cleaning the recorder head almost continuously.

It appears that the tape is sub-standard and was shedding its magnetic coating.

The main program is probably one of the best of its type. What a pity the same care wasn't taken with the sound and the instructions. And as for that unmitigated disaster of a tape...

Michael Gilbert

It's hard being a gargoyle

IN **Nightworld,** a new release from Alligata, you must explore the many vaults of a cavernous underworld.

The vault that you're in fills

→

ADVENTURE SURE TO SUCCEED

KNIGHT Lore, from Ultimate, is the sequel to their first blockbuster, Sabre Wulf.

The hero of the first epic, Sabre Man, carries the curse of the wulf, so each day as the light fades he undergoes a dramatic transformation from man to wulf.

In an effort to rid himself of the curse, he has travelled to Castle Knight Lore to seek the help of the old wizard.

He must find the wizard within 40 days or remain a wulf forever.

Ultimate have certainly not fallen into the trap of merely rehashing a winning formula by presenting Sabre Wulf in a castle.

Knight Lore is one of the best pieces of programming I have ever seen on the BBC Micro and it's light years ahead of Sabre Wulf.

The action takes place inside the castle. The graphics are merely two-colour, but the characters and objects within the room are drawn with such stunning 3D realism and perspective that you can almost touch them.

The controls for the game are – rotate left and right, walk forward, jump, and pick up objects.

When rotating Sabre Man, or the wulf, you are presented with an extremely detailed view of each of the character's four sides in turn.

As you search the castle you will find that some of the rooms contain objects.

These may or may not be useful in your quest, but if you don't pick them up you'll never know.

This is easier said than done, as the objects are normally situated in the most inaccessible part of the room and can only be reached by negotiating some fiendishly clever three-dimensional obstacle.

One such obstacle consists of a type of spiral staircase constructed from blocks of stone that are suspended in mid-air.

The first of the blocks is situated on the far side of the staircase and must therefore be jumped blind.

The rest of the manoeuvre consists of a series of rapid jumps and turns as each of the blocks begins to drift earthwards as soon as Sabre Man touches it.

Dawdle too long and you have sunk so low that you are unable to reach the next step.

Other hazards in the game include guards, ghouls, spiked floors, and huge spiked balls which fall from the ceiling.

All of these are drawn in superb detail and you are even treated to the spectacle of Sabre Man's very impressive transformation from man to wulf and vice versa.

Knight Lore pushes the concept of arcade adventure games to its limits and will definitely be one of the big sellers of 1985.

Jon Revis

From Page 77

the screen and consists of many platforms, flying harpies, stinging nasties to be avoided and, of course, various exits.

The aim of the game is to jump about the vaults, collecting the objects that will lead to the final escape route and the magical golden fleece.

You start off with a certain amount of energy that is sapped if you fall or encounter a nasty. If you run out of energy you're dead.

The instructions say that there is a way to replenish your energy, but they don't tell you how.

Day and night are signified by a globe slowly moving across the screen.

As the sun sets, you change into a mutated gargoyle which can jump much further. As day dawns you are returned to your former self.

The quality of the graphics is high, with excellent title pages and various shades of colour to produce the vault pictures.

The movement and detail of the characters is good. The flapping and gyrating gargoyle is an excellent example of the art of animation.

The sound is also well implemented with plenty of tunes, blips and squeaks.

The major fault with this game, however, is that it is infuriatingly difficult to play.

I found myself stuck for ages on one screen, seemingly unable to climb up the platform.

The instructions were also poor, with spelling mistakes, incorrect playing keys and claims of joystick compatibility.

In the end, the actual keys were quite sensible, though there was no joystick option.

In my opinion, this game suffers from being so hard to play that it ceased to be enjoyable.

Phil Tudor

Tempest keeps faith

I HAVE always enjoyed playing real arcade games because of their high standard of graphics and sound compared to the often inferior computer versions.

However, all that seems to have changed with Superior Software's version of **Tempest.** This official version of the Atari arcade game is a faithful replica.

As the yellow Claw, you must destroy your enemies with your blaster before they reach the edge of the stargate. There are nine different shapes of stargate and you move round the outside rim.

The colour of the stargates changes as you progress through the 255 different levels and you will encounter new enemies in later levels.

When things get really hot you can destroy everything on the screen with the aid of your Super Zapper, which gives a rather good effect when used.

However, it can only be used once in each frame.

One problem when using the joystick is that there is no button for the Super Zapper, so you have to reach for the keyboard every time you want to use it.

One of the main features of Tempest is the speed of its graphics and smoothness of movement. The sound is also excellent.

Although the disc version is a little expensive, Tempest is certainly a cut above the average. It is fast, highly addictive and well recommended.

Simon Rubins

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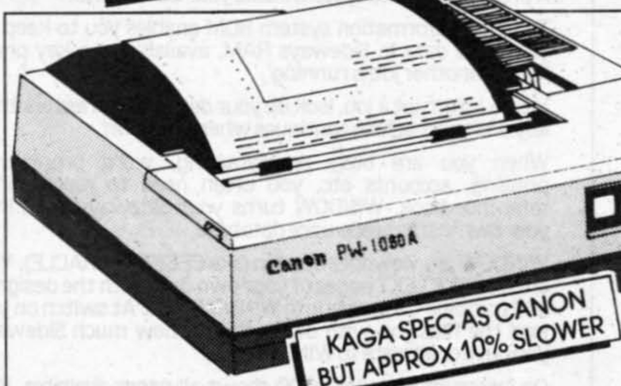

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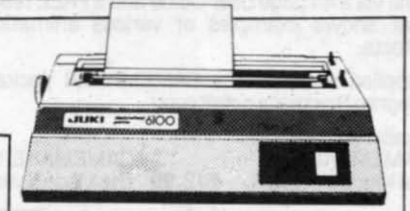

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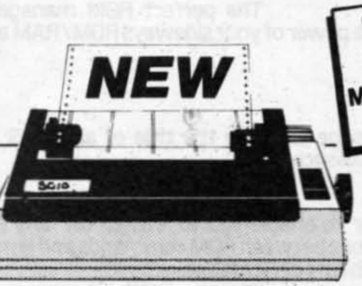

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Concluding

HOW TO WRITE MACHINE CODE GAMES

By KEVIN EDWARDS

RANDOM THOUGHTS and KEYBOARD CAPERS

IN this, the final part of the series, we shall be looking at random numbers and routines to check the keyboard. We'll start off with random numbers.

There are very few games which don't use random numbers. So for this reason we shall see how random numbers can be created using several different methods.

In BBC Basic, random numbers are created by applying a complex algorithm on a series of numbers, known as the random seed. This causes pseudo random numbers to be set up in the seed. These seem to have no set pattern and so are considered random. In fact, they follow a series which is very complex.

The complexity is such that the series repeats only after several million calls!

BBC Basic's random number generator is seeded with the same number each time the micro is turned on. This results in the same random numbers being generated. If you don't believe me, turn your micro off, then on, and run the following program:

```
10 FOR L=1 TO 10
20 PRINT RND(10)
30 NEXT
```

Repeating the process will result in the same numbers being generated.

The only way to stop the numbers repeating is to initialise the seed with a different value.

The seed used by Basic can be found in zero page locations &D to &11. One obvious way to change the seed is to poke new values into these locations.

The problem with poking values into the seed is that these new numbers must be random else another series of numbers will be repeated.

We now need random numbers to seed the random number generator. We seem to be going backwards don't we? In fact, we can seed the random number generator by issuing an RND command with a negative parameter.

This is favoured to the naughty poking method. So a command such as:

```
dummy=RND(-TIME)
```

at the start of the program would provide a solution.

Notice that TIME was used to reset the seed. This is quite acceptable because its value will almost certainly be different each time it is executed since TIME is always changing. This results in an almost perfectly randomised seed.

Implementing this in machine code is quite a tricky business. Before we do this, let's see how BBC Basic creates a new set of values in the seed by disassembling the Basic ROM.

The start address of the routine is &AF87 for Basic II micros or &AFB6 for Basic I. If you don't have access to a disassembler, printed above is the ROM routine which is, of course, the copyright of Acorn.

```
.start   LDY #&20
.next    LDA &F
         LSR A
         LSR A
         LSR A
         EOR &11
         ROR A
         ROL &D
         ROL &E
         ROL &F
         ROL &10
         ROL &11
         DEY
         BNE next
         RTS
```

Calling *start* creates five random bytes in locations &D to &11 – the seed workspace. (Assuming the locations have been seeded with a value not equal to zero.)

The routine looks simple but is in fact quite complex. See if you can work out what happens to the seed bytes.

Program I is a fast, crude random number routine which repeatedly creates a single random number and prints it out. Press Ctrl N before running the program to turn on the paging mode.

The routine creates a random byte by accessing several very useful locations. These are:

&FE44 – Timer 1 low order counter in

→

```
 10 REM Crude random number
 20 REM generator
 30 REM By Kevin Edwards
 40 FOR pass=0 TO 2 STEP 2
 50 P%=&C00
 60 [OPT pass
 70 .start
 80 LDA&FE44:EOR&FC:EOR&FE65
 90 JSRprintbyte
100 LDA#ASC" "
110 JSR&FFEE:JSR&FFEE
120 JMPstart
130 .printbyte
140 PHA
150 LSRA:LSRA:LSRA:LSRA
160 JSRdigitout
170 PLA:AND#&F
180 .digitout
190 CMP#10:BCCnumeric
200 ADC#6
210 .numeric
220 ADC#48
230 JMP&FFEE
240 ]NEXT
250 CALLstart
```

Program I

From Page 81

the system VIA (Versatile Interface Adapter). This counter is decremented every millionth of a second and so provides a reasonably random number.

&FC – Accumulator copy from the last interrupt. Each time an interrupt occurs the accummulator is saved in location &FC. Since interrupts can occur at almost any time the accumulator's value will be almost unpredictable – depending upon the section of program being executed when the interrupt is requested.

&FE65 – Timer 1 high order counter in the user VIA. Again, this decrements quickly but obviously at a slower rate than the low order counter – 1/256th of the speed.

Reading from &FE44 and EORing with the other two locations results in a random number. This method is very crude and probably has a poor frequency distribution, but it isn't half fast!

A word of warning. The VIA registers cannot be directly accessed if the program is being executed in the 6502 2nd processor memory.

Also included in Program I is a hex number print routine. This prints the contents of the accumulator as a 2 digit hex number. You'll find this routine very useful if you haven't already written a similar one.

For cases where a "better" random number generator is needed, Program II should be used. Although it's relatively slow, it provides five random bytes.

The algorithm Program II uses is similar to the one in the Basic ROM but uses a slightly different approach.

Line 360 in Program II is used to initialise the seed bytes. As you can see, it uses a low order counter in the user VIA as a seeding value.

The best way to generate a true random set of numbers is to use the random routine from Program I to initialise the seed for Program II, then Program II's random number generator can be used to create the random bytes.

The end result will be a reliable set of random values.

For the majority of cases random bytes in the range 0-255 are quite acceptable. But there are times when custom random number routines are needed.

For example, in a dice game we require random numbers between 1 and 6. Obviously a random number between 0 and 255 is of no use in this case.

Unfortunately there is no simple answer to this problem. The only easy way to do this is by using floating point numbers.

Let me explain.

A random integer between 1 and n can be created by using the following statement:

```
rand=INT(RND(1)*n)+1
```

Which is usually shortened to:

```
rand=RND(n)
```

The RND(1) returns a number between 0 and 0.999999999 and the *n* enlarges this number so that it falls within the range we require. The integer part of the result is taken and 1 is added to it to give us our final answer.

Doing all this in machine code is quite a task. First of all a random number between 0 and 0.999999999 must be created (not too difficult). This is then multiplied by *n* (don't forget, we're in machine code). After which the integer part of the result is taken and 1 is added to give us our final answer.

Let me warn you now, machine code floating point routines are not easy to write. We could of course use the Basic ROM routines, but that's cheating!

You'll find that the Basic ROM contains some clever, and very useful routines which are needed at some stage by all machine code programmers.

It is at this point that praise should be given to the author of BBC Basic, Roger Wilson (and all others concerned). By using very clever programming skills he provided us with one of the fastest, comprehensive versions of Basic available for any home micro. And to add the icing to the cake, he included a superb assembler.

That's enough of random numbers. Next we'll see how to check the keyboard.

Checking if a key is pressed is quite a simple process – all we do is call a routine in the operating system – OSBYTE (&FFF4).

Before this can be done the A, X and Y registers must be set up with various information.

The accumulator should contain &81 indicating that OSBYTE call &81 (read

```
 10 REM Random number generator
 20 REM By Kevin Edwards
 30 seed=&70
 40 FOR pass=0 TO 2 STEP 2
 50 P%=&C00
 60 [OPT pass
 70 .random LDY#4
 80 .again
 90 LDAseed,Y:ADCseed+2:EORseed+1
100 LDX#4
110 .again2
120 ROLseed+2:EORseed,X:SBCseed,Y
130 SBCseed,X:ASLA:RORseed,X
140 DEX:BPLagain2
150 DEY:BNEagain
160 LDX#4
170 .nextseed
180 LDAseed,X:JSRprintbyte
190 LDA#ASC" "
200 JSR&FFEE:JSR&FFEE:JSR&FFEE
210 DEX:BPLnextseed
220 RTS
230 .printbyte
240 PHA
250 LSRA:LSRA:LSRA:LSRA
260 JSRdigitout
270 PLA:AND#&F
280 .digitout
290 CMP#10:BCCnumeric
300 ADC#6
310 .numeric
320 ADC#48
330 JMP&FFEE
340 ]NEXT
350 FORL%=0TO4
360 L%?seed=?&FE44
370 NEXT
380 REPEAT
390 CALLrandom
400 UNTIL 1=2
```

Program II

a key) is being executed.

The X register indicates the key being checked. Its value should correspond to the key's negative key number. These can be found on page 275 of the User Guide.

Once the negative value is known it must be converted into a 2's complement byte. This is done by printing the hexadecimal value of the number. For example, to find the value for X when we wish to check for the Spacebar we would enter:

```
PRINT ~-99
```

which would give:

```
FFFFFF9D
```

The only part of the number we're interested in is the 9D – not the six leading Fs. So to check for Space we load the X register with &9D.

The Y register must always contain &FF.

Our key read routine would look something like this:

```
.check_key      LDA #&81
                LDX #&9D
                LDY #&FF
                JSR &FFF4
```

On exit the X and Y register will contain &FF if the key is pressed. If Y is 0, the key isn't pressed. Adding this information to the routine would result in:

```
.check_key      LDA #&81
                LDX #&9D
                LDY #&FF
                JSR &FFF4
                CPY #&FF
                BNE not_pressed
                JSR reaction
.not_pressed    (Rest of program)
```

To save repeating code a general keyboard routine can be used. For this routine only the X register is required:

```
.check_key      LDA #&81
                LDY #&FF
                JSR &FFF4
                CPY #&FF
                RTS
```

On exit the Z flag is 1 if the key is pressed or 0 if it isn't. This can be checked for using BEQ or BNE in the following way:

```
.check_space    LDX #&9D
                JSR check_key
                BNE check_return
                JSR reaction1
.check_return   LDX #&B6
                JSR check_key
                BNE check_space
                JSR reaction2
                JMP check_space

.reaction1      (routine if space
                is pressed)
                RTS

.reaction2      (routine if return
                is pressed)
                RTS
```

And that concludes the series. I hope you've enjoyed following it as much as I've enjoyed writing it.

Over the past few months we've covered only a fraction of the things associated with machine code games.

I hope you'll remember me when you're earning thousands of pounds for your latest machine code game. See you again some time.

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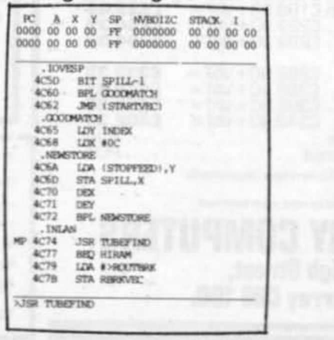
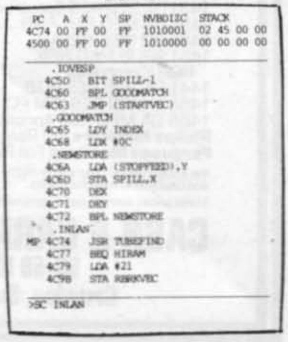


```
 PC   A  X  Y  SP  NVBDIZC  STACK  I
0000 00 00 00  FF  0000000  00 00 00 00
0000 00 00 00  FF  0000000  00 00 00 00

  .IOVESP
  4C50   BIT SPILL-1
  4C60   BPL GOODMATCH
  4C62   JMP (STARTVEC)
  .GOODMATCH
  4C65   LDY INDEX
  4C68   LDX #0C
  .NEWSTORE
  4C6A   LDA (STOPFEED),Y
  4C6D   STA SPILL,X
  4C70   DEX
  4C71   DEY
  4C72   BPL NEWSTORE
  .INLAN
MP 4C74   JSR TUBEFIND
  4C77   BEQ HIRAM
  4C79   LDA #>ROUTBRK
  4C7B   STA RBRKVEC

>JSR TUBEFIND
```

Debugging Screen



```
 PC   A  X  Y  SP  NVBDIZC  STACK
4C74 00 FF 00  FF  1010001  02 45 00 00
4500 00 FF 00  FF  1010000  00 00 00 00

  .IOVESP
  4C50   BIT SPILL-1
  4C60   BPL GOODMATCH
  4C63   JMP (STARTVEC)
  .GOODMATCH
  4C65   LDY INDEX
  4C68   LDX #0C
  .NEWSTORE
  4C6A   LDA (STOPFEED),Y
  4C6D   STA SPILL,X
  4C70   DEX
  4C71   DEY
  4C72   BPL NEWSTORE
  .INLAN
MP 4C74   JSR TUBEFIND
  4C77   BEQ HIRAM
  4C79   LDA #21
  4C9B   STA RBRKVEC

>SC INLAN
```

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MU8

MIKE MAHON takes a new look at Basic Toolkit ROMs and reports himself . . .

Tempted, by a full screen editor

LAST October both *The Micro User* and *Acorn User* reviewed a total of eight utility ROMs which had Basic Toolkit features as their hallmark.

These were all 8k ROMs having similar, though variable quality, Basic programming aids as well as the occasional smattering of machine code utilities. Some, like Addcomm and Toolstar, also possessed additional facilities for graphics or discs.

I concluded my review with a plea for improved facilities for disabling unwanted ROMs, Help messages, a cross referencer and variable dumper, and most of all a decent trace facility. I then looked forward to a full 16k programming utility with second processor compatibility.

Well, have my hopes been fulfilled? What has been happening on the utility ROM front since then?

As usual, the fertile minds of BBC programmers have been highly active, though companies have packaged their new utilities in various combinations. Currently there are about 17 BBC ROMs on the market which have a Basic programmers-aid flavour to them – see Table I. In addition, the release of Acornsoft's 16k Basic Editor should hot up the market.

Some packages – Brom, Basic-Ed, Xtend – have stuck to the well-tried Basic Toolkit recipe. Other have specialised into enhancing the Basic language – Basic Extensions – or offering a complete debugging aid like Microscope and Sleuth. Two of them, Slave and Probe, have dared to pick up where Toolstar left off and go the whole hog for a multifunction 16k Superom.

The two Basic debugging ROMs, Microscope and Sleuth, were reviewed by Jim Notman in the June, 1985, edition of *The Micro User*. Part one of this update deals with Brom. Next month we'll look at Basic Extensions, and in the final part of the series, at Slave and possibly Acorn's Basic Editor.

Clares' Brom (Version 1.14) is an 8k utility eprom which comes with a standard A5 format 36-page manual having an impressive black-and-gold cover.

According to the manual, "... The Brom utility has been written for the purpose of providing as many of the most useful and often looked-for utilities as can be fitted into a simple, reasonably cheap, 8k eprom".

Indeed, it has 21 commands – see Table II – which cover most of the main categories a Basic programmer might require. Its major feature, however, is its full screen editor, more of which later.

Brom does not signal its presence at power up, nor does it grab any precious user RAM by altering PAGE. Commands may be preceded by the letter Z, for example *ZPACK, in order to avoid clashes with similar commands from other ROMs. Indeed, Brom has the option, fast becoming a necessity, to switch out individual ROMs.

They even remain switched off following a Break or Ctrl+Break which is a very useful feature when using autoboot disc-based programs which are upset by certain ROMs. Furthermore, all ROMs may be switched on or off with *FX commands.

Unfortunately, Clares have omitted to provide a ROMs-list command, so you may require educated guesses concerning ROM socket locations.

Getting back to the Basic utility functions, there is no command for indicating memory usage, though "bytes free" is present within the Editor. The function key command was well implemented, giving the amount of space available as well as allowing editing of their contents.

With regard to line renumbering, program lines can be moved elsewhere within a program, *LMOVE, or simply duplicated, *LCOPY, into a new location. However, it was not possible to procure a partial renumber as with some other toolkits.

The whole program can also be moved to a new location using *PAGE which is particularly useful in gaining back the space occupied by the DFS workspace in order to run cassette-based software from disc.

The standard requirements of the Basic programmer's utility, that is to readily find and alter items within a program, were well implemented in Brom. Wildcards could also be used with the *FIND and *CHANGE options and the program area to be dealt with could also be *LIMITed. The selective change option was very good,

→

Previous ROMs	Addcom, Vine Micros; Caretaker, Computer Concepts; Toolkit, Beebugsoft; Toolstar, Pace; U-tools, Intersoft; Aids II, Softsmith; Molitool, Molimerx; Toolkit, Dataware; Urom, J & H.
New Basic Toolkits	Brom, Clares; Xtend, Primasoft; Basic-Ed, Altra.
Enhanced Basic	Basic Extensions, MicroPower.
Debuggers	Microscope, Yorkshire Hi Tech; Sleuth, Beebugsoft.
Superoms-16k	Probe, Altra; Slave, A & F.

Table I: Basic Utility Roms

From Page 85

highlighting the desired item in red.

In my opinion a touch of colour would not go amiss in improving the find routine, bringing it on a par with that of Beebugsoft's Toolkit. Brom had no problem in finding or replacing Basic keywords which were simply indicated by the T (for tokenised) parameter.

Now let's move on to another major requirement of the Basic programmer: What variables have I used and where are they?

There is a reasonably good variable dump which allows the user to select numeric, integer, string or array variables. The numeric list is particularly impressive with both the decimal and hexadecimal values given. Like most other toolkits, the array dump is limited to giving the dimensions rather than the contents of the array. Only Molitool had the latter facility in the chips reviewed earlier.

These features are, of course, better implemented on the Basic debugger toolkits such as Microscope and Sleuth. It would, however, have been useful if Brom had included a cross-reference utility to locate all line occurrences of program variables.

Finally, with regard to variables, they may all, including resident integer variables, be cleared using *FLUSH, despite what it says in the manual.

In order to compact programs by removing unnecessary spaces or REM statements, the *PACK command is available on Brom. Unfortunately, in addition to being unintelligent – that is, it may remove REM lines referred to elsewhere in the program – it seemed to be somewhat erratic in leaving a few unwanted REMs around.

*BPCURE for repairing bad programs did, however, operate very well and revived most corrupted programs. The verify routine (*COMPARE) was also very easy to operate and should ensure that all saved programs were identical to those in memory and safe before switch-off.

Another useful facility for the Basic programmer is to split multistatement lines to improve legibility when listing. This was implemented by *FLIST on Brom and gave a very neat screen display but a rather scruffy printout, as long lines were indented towards the left margin.

Some useful extra features were included on Brom such as *CASE and *ONEKEY. The former is a novel feature which allowed the user to limit keyboard entry to lower or upper case, which is a boon for validating program input.

The latter command also aids typing in programs as a TAB followed by a letter enters a Basic keyword as on the Electron. In addition a listing is provided in the manual for defining your own single key entries.

Five of the above-mentioned commands, CASE, ONEKEY, NORMKEY, ROMON, ROMOFF, also work across the Tube with a 6502 second processor attached – though the latter and potentially most useful command in this situation was rather inconvenient to use.

Now we come to Brom's *pièce de resistance,* the screen program editor. This may be entered at will using *EDIT or automatically when an error occurs during a run if the enhanced error message option has been enabled beforehand. This is the best Basic screen editor I have so far used.

A Mode 7 screen is selected with a colour band at the top indicating insert or overwrite mode and an update on bytes free. The user can scroll forward, backward, left or right, and insert or delete characters or whole lines. It was very fast indeed and a pleasure to use. Program lines could be easily fixed or altered without having to copy the line.

In conclusion, Clares' Brom has a number of plus points including the manual, the screen editor, the ROM switch off and a generally good implementation of search, change and function key features.

It is rather lacking, however, in facilities for memory information, ROMs listing, partial renumbering, cross-referencing and tracing, and has a poor pack routine.

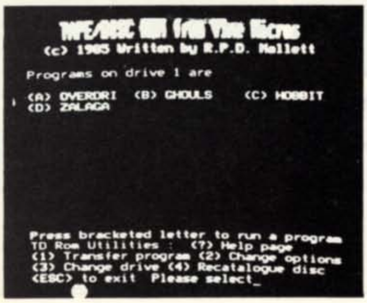
It did also clash regularly with certain other ROMs, particularly Watford's Rom Manager, which had to be switched out to avoid severe program crashes, and it totally ignored or paralysed A&Fs Slave. To be fair, this is probably as much the fault of these other ROMs as it is of Brom.

Brom is not a major breakthrough in utility chips, but for an 8k Basic programmer's aid it performs fairly well in certain areas and I would put it alongside Beebugsoft's Toolkit and Computer Concepts' Caretaker when making a choice. It may well be worth buying, however, just for the screen editor alone.

*BPCURE	Repairs bad program.
*CASE	Restricts input to upper, lower or mixed case letters only.
*CHANGE	Global replacement of specified string.
*COMPARE	Verifies saved file against program in memory.
*EDIT	Invokes the Basic screen editor.
*ERR	Enables or disables enhanced error routine.
*FIND	Lists all lines with occurrences of specified string.
*FNKEY	Lists for editing all defined function keys.
*FLIST	Splits multistatement lines in listings.
*FLUSH	Clears all variables.
*LCOPY	Duplicates section of a program.
*LIMIT	Identifies line range for other commands.
*LMOVE	Moves specified section within a program.
*LVAR	Dumps contents of variables.
*NORMKEY	Cancels effects of ONEKEY.
*ONEKEY	Allocates Basic keywords to individual keys.
*PACK	Removes spaces and/or REMs from program.
*PAGE	Moves and runs program to specified PAGE in memory.
*ROMOFF	Switches out a specified ROM.
*ROMON	Switches back in a specified ROM.
*SCHANGE	Selective replacement of specified string.

Table II: Brom commands and facilities

TD ROM©



```
TAPE/DISC ROM from Vine Micros
(c) 1985 Written by R.P.D. Mallett

Programs on drive 1 are

(A) OVERDRI   (B) GHOULS     (C) HOBBIT
(D) ZALAGA





Press bracketed letter to run a program
TD Rom Utilities :  (?) Help page
(1) Transfer program (2) Change options
(3) Change drive (4) Recatalogue disc
<ESC> to exit  Please select_
```

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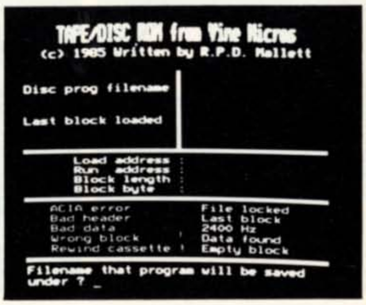

```
TAPE/DISC ROM from Vine Micros
(c) 1985 Written by R.P.D. Mallett

Disc prog filename

Last block loaded

      Load address  :
      Run  address  :
      Block length  :
      Block byte    :

   ACIA error           File locked
   Bad header           Last block
   Bad data             2400 Hz
   Wrong block        ! Data found
   Rewind cassette !    Empty block

Filename that program will be saved
under ? _
```

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- Allows use of all available RAM, (&400 to &7FFF).
- Can handle any length of program.
- Can handle any number of programs.
- Can save to any disc.
- Very user-friendly, (menu driven).

- Contains two transfer routines to ensure effective loading of all but a few currently available software tapes.
- Adventures normally taking six minutes to load will now take about five seconds.
- The system automatically switches to TAPE filing after loading, so that you can still load/save games positions, etc.

- Available only for these Disc Filing Systems, (state type when ordering).
- Type 8271 – Acorn DFS and DNFS, Amcom S/D and Watford S/D.
- Type 1770 – Opus 3.45 and Solidisk, (working in Single Density).
- Type 2791 – Opus 3.15, (working in Single Density).

N.B. This ROM solely provides convenience in loading, and does not break software protection.

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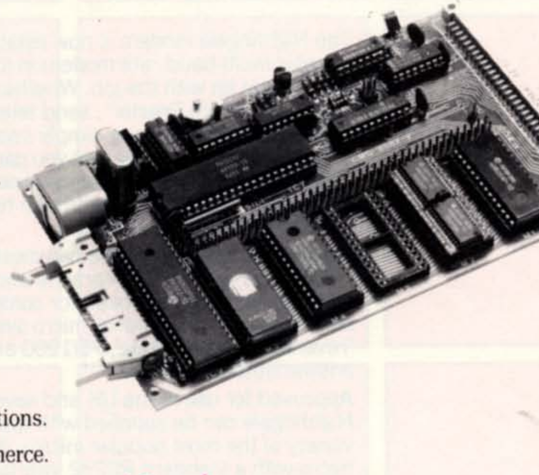

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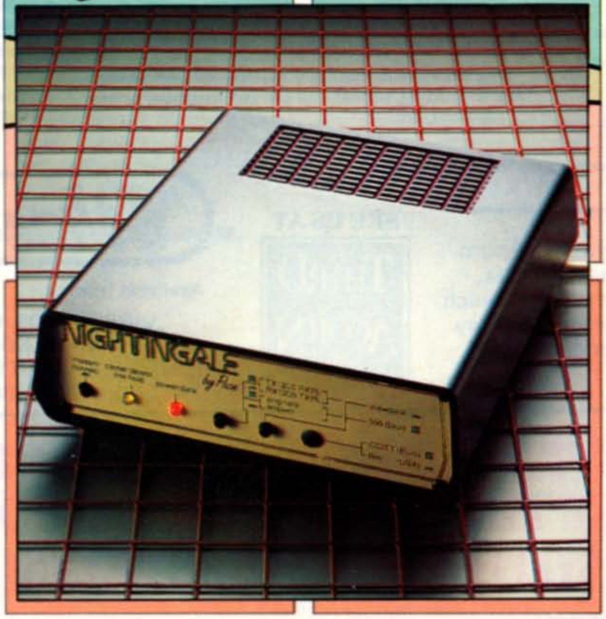

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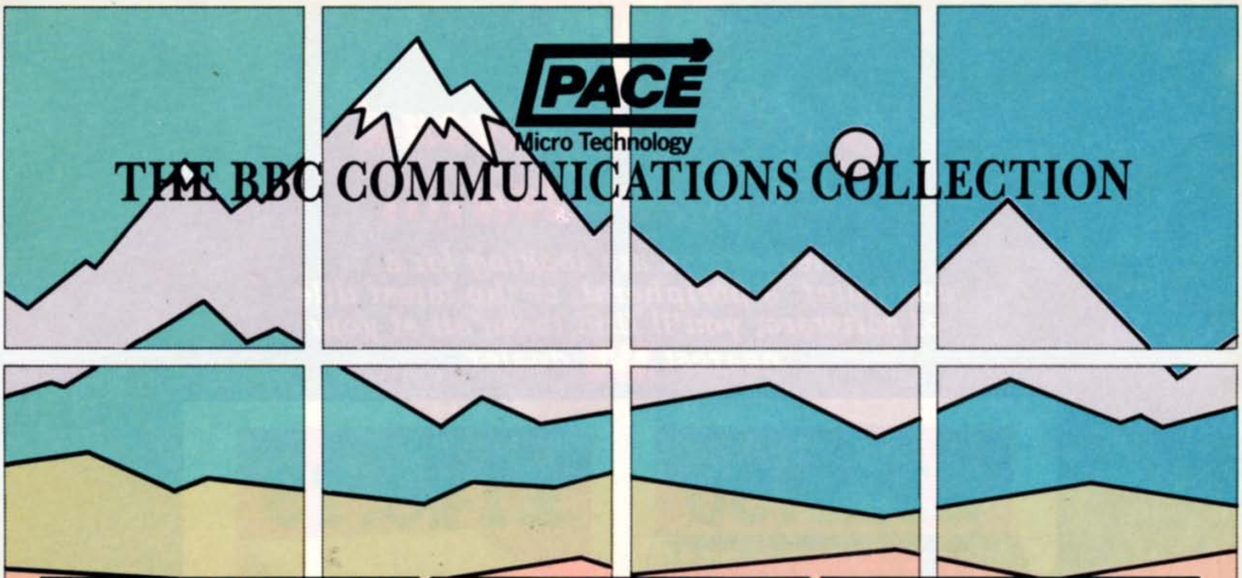

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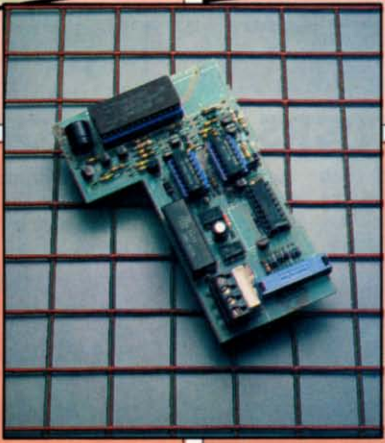

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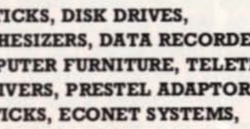

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Alice through the VDU

Our monthly foray into Adventure games

Puzzling over riddles and hackers

ON the night of August 7, 1979, Kit Williams buried a golden hare at the exact spot where the tip of the shadow of Catherine of Aragon's memorial near Ampthill falls on March 21 – that is the equinox.

The clues to identify this spot were hidden in a book called Masquerade, which has since sold more than a million copies. At first sight it contains 15 very detailed pictures linked by an apparently simple story of how the hare was lost.

The book is a masterpiece of clever seduction because it contains riddles and puzzles that a child of 10 can solve, together with four enigmatic squares that only a mathematician-cum-physicist would probably recognise.

The first of them is a magic square of great antiquity – see Melencolia, the Affliction of Scholars, by Albrecht Durer painted in 1514 – in which the rows, columns, diagonals, quarters, corners and middle all add up to 34:

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

Williams omitted the 7 so that it appeared to be a simple sliding block puzzle. Actually linking the numbers with another, coloured square made a consistent red, yellow, green, blue sequence – the colours of the rainbow – another hint that figure 7 was important particularly as one picture had the words "One of six to eight" along the bottom?

When the third square, however, is decoded as atomic numbers the element letters read "False no use think again". The fourth square was a jumble of numbers, one of them being 527 – almost certainly a "confirmer" which is vital to puzzles of this kind since it is a little-known fact that 100 random letters can be arranged to say anything and point anywhere.

On February 24, 1982, more by luck than analysis, the hare was unearthed. Williams was disappointed that his riddle had not been deciphered, but three weeks later he received a 15-letter acrostic that proved it had been cracked by two unlucky physics teachers.

The 15 letters were extracted from the 15 pictures in order. The details of how this was done are given in Bamber Gascoigne's book, Quest for the Golden Hare, together with some disturbing insights into the mentality of a few puzzle-solvers and some strange coincidences.

Gascoigne's book was not the end of the story because the hare, now valued at £30,000, can again be found by solving the clues in the two Hareraiser programs from Haresoft which begin as follows:

A Hare of Gold and Jewels was hid
It lay beneath the Ground
A Seeker solved the Riddled Clues
And a Beautiful Treasure found.

Not quite what actually happened, but let us allow some poetic licence – and Kit Williams to spell confectionery as confectionary. The challenge is that "No Spade or Pick or Computer Trick" will be needed.

To many people who thought they might get an adventure-type puzzle, the programs must be disappointing.

The first generates 26 pictures of a simple landscape scattered with bushes and trees under a sky dotted with 20 stars and the odd cloud – the sun appears to be placed carefully.

The only animation is a hare that sometimes runs on to the screen and then buries itself.

Each picture also contains some enigmatic text like "The sun shines up" and you can move between pictures using the cursor keys.

A listing is easy to obtain and, for what it's worth, I make the following observations.

- The pattern of stars is generated via a SIN and COS function, therefore unlikely to contain any message.
- The second program has only 24 pictures. All 50 pictures have a different number of trees, bushes, clouds, hare or sun/spider positions.
- Allowing for up to nine trees, seven bushes, and so on, then observation 3 is

not statistically significant over 50 random trials. Nevertheless it is simple way to hide a message in a program that must run on a variety of micros.

I haven't solved it, nor am I likely to. What stops me putting effort into such riddles is a simple lack of trust. A few years ago a pyramid puzzle appeared in which "Imagination is the key – and it is for this reason a child of ten is as likely to find the solution as an adult – and of course it is also why computers cannot cope".

It appears that to discover his pattern you had to subscribe to The Times newspaper (as many 10-year-olds do) for extra clues. The Times appears essential reading for such puzzles, since an extra clue to Kit Williams' Masquerade was also given in the paper and later proved essential to the solution obtained by the two physics teachers.

Consequently I am wary of real treasure puzzles. Kit Williams was an exception since his book appealed at many levels – the pictures and story were worth the price by themselves. Perhaps, since he worked with computers in the Royal Navy, he could invent a really good puzzle for the computerate who don't – or can't read The Times.

Not everyone solves puzzles for fame or fortune. Indeed there is a "happy band of brothers" who risk criminal proceedings should they succeed. These "hackers" have a Robin Hood image in America, whereas Britain, not the land of the free nor country of the brave, considers them an anarchistic nuisance.

Quite simply the main defence most computers have against unauthorised entry is a simple password associated with an account number. By simple I mean always the same until the owner changes it – or forgets it, in which case only a privileged terminal can reset it.

It is quite possible to have variable passwords based on algorithms and very secure systems contain a profile of the user (age, education, blood group, etc) so they can, randomly, ask for his grandmother's maiden name from his personnel file and, if it's wrong, keep the suspect in ignorance of being spotted.

Most systems are not this secure and the media is always delighted when one is apparently broken. In actual fact we never hear about all the failures to crack the system. Also the code of the hacker is not to damage anything but merely leave his calling card – "Kilroy was here" is the most common.

"These hackers have a Robin Hood image in America"

Hacker 2000 (Micrograf) by Andy Mitchell gives a revealing insight into this strange behaviour. The program loads to the strains of Mars, from The Planets, by Gustav Holst – a change from the more-usual Baroque recitation. It used to be the theme music of the Quatermass experiments on TV – a foreboding anti-science series – but, in this case, appears to declare war on computer security.

The first part is a fairly conventional game which requires you to get control of the maintenance droid Rover V and then use him to infiltrate the Multivax computer shrine.

You should not play this part at work because the droid looks more like a robot and tends to float across the screen flashing his headbulb and occasionally getting his "sideways RAM poked". This can be tiresome since the I/O runs at about 300 baud and it can take a minute or so to regain control with a RESTORE.

Once inside the machine room, however, the average boss could never tell that you're playing about, particularly as they still have lineprinters in the year 2000 to despool files.

Your task is to hack into the top security files of Multivax to change your status from Prole to Programmer and also adjust the odd bank account. In the process you will uncover some scurrilous libel and also, just for the hell of it, start World War 3.

I must confess that Andy Mitchell can make me laugh and the game is very clever. It also gives the player a fairly good idea of how hackers go about their offbeat activities. If that intrigues you, then "Have a nice day" with this unusual adventure.

Restoring the rainbow

The problem in Rainbow Riddle *(The Micro User,* February, 1985) was to restore the order of the rainbow's colours, which had been scrambled randomly, where the program setting the puzzle varied the number of moves allowed every time.

All you had to do was to invent a couple of simple rules that would always restore the rainbow in the given number of moves, no matter how scrambled the colours were.

It's derived from a famous computer science puzzle called the elevator problem – see The Art of Computer Programming, Vol. 3, by Donald Knuth.

In this particular case the rainbow has seven levels, each having three colours. There is a single elevator that carries just two colours.

The elevator always starts at the first level and moves up and down, swapping colours, until every colour is where it should be. The elevator must also finish at the first level in a pre-defined number of UP/DOWN moves.

The first thing to notice is that there is *always* a violet at the top level to begin with, therefore the elevator *must* visit all levels – the positions of all other colours are random.

The algorithm to sort the colours in the given minimum number of moves is as follows:

You are either moving UP or moving DOWN. Begin in the UP state.

UP: IF no colour at the current level

→

From Page 93

```
    needs to go up, THEN GOTO
    DOWN ELSE get the two highest:
    go up one level: GOTO UP.
DOWN: get the two lowest: go down
    one level: IF no colour below current
    level needs to move up to or beyond
    this level THEN GOTO UP ELSE
    GOTO DOWN.
```

Confused? You will be if you try to understand why it works. In fact this algorithm is guaranteed to sort *any* number of colours for *any* number of levels in the *minimum* number of moves provided that:

(a) The elevator has to visit all levels.

(b) The elevator holds less colours than the levels.

A similar, more adventure-like, problem would be to have seven caves randomly scattered with gold, silver, copper bars and so on, except for one bar of gold in the farthest cave.

You start in the gold cave and have to sort the bars correctly in a given number of moves with the reasonable restriction that you can only carry two bars at a time.

The Knapsack Problem: Ever thought how silly it is that in adventures you meet situations where you can carry three elephants and not be able to pick up a feather? Computer science has also considered this puzzle.

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SIZE	9	8	7	4	3
VALUE	13	11	10	5	4

So you could pick up just four Ds (total size 16) for a total value of 20. What is the best mix? Even harder (but with very commercial applications) is to write a program that, given random sizes and values of A-E, can always select the mix of items that maximises the take.

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BUG
DETECTOR

CHRIS BOWERMAN
examines Basic error handling techniques

UNDOUBTEDLY one of the most common tasks which a programmer must perform is that of correcting his errors.

Although I do not propose to supply the modern-day equivalent of the Alchemist's Stone which would turn bug-ridden programs into bug-free ones, an examination of the mechanisms used for dealing with errors in Basic and machine code will not only increase our understanding of how to deal with them but will provide a useful utility too.

Basic's principal error-handling statement is:

```
ON ERROR <do something>
```

When an error occurs the computer will carry out the commands which follow this statement, for example see Program I:

```
10 ON ERROR GOTO 60
20 FOR A=1 TO 10
30 PRINT A
40 NEXT
50 END
60 PRINT"This is an error handler."
70 END
```

Program I

When an error occurs, that is something which Basic cannot understand, it will carry out the instructions following the ON ERROR statement. It will thus GOTO line 60, print out the fact that it has got to the error-handling routine and end.

First, let's check that our program runs. Type in RUN and the numbers from one to ten should be printed out.

To prove that the error-handling routine works we must create an error and see if it performs as expected. We could do this by hitting the Escape key before the program has finished running, which would give the Escape error, or by entering a line with a deliberate error in it. We will take the latter approach by entering in the following line:

```
15 This is a deliberate error
```

When the program is now run it prints: "This is an error handler" on the screen to show that it is executing the handler, and then ends. The Escape key acts as if an error has occurred so that programmers can detect when the key is hit and prevent people from stopping the program.

Note that the error handler does not print out the error message and the line at which it occurred – it has not been told to do so and merely executes our error handler. To get it to tell us what type of error occurred and where it occurred we must make it. We may do this by adding the following lines:

```
62 REPORT
64 PRINT" at line ";ERL
```

The keyword REPORT tells the computer to print out on the screen in words the type of error that last occurred. The PRINT statement of line 64 will print next to the error message the word " at line " and then the contents of the variable ERL.

The variable ERL is one of the computer's own variables – like TIME, TOP, ERR – which you cannot alter. It contains the line number at which the last error occurred.

REPORT is not a variable and, unlike ERL or ERR – of which more later – cannot be compared with other variables within a program. It will only print out the text of the last error message on the screen.

The net effect of lines 62 and 64 is to print out on the screen the error which occurred and in the same format as the computer usually does.

Now run the program and not only will the computer print the "This is an error handler" message, it will also inform us what the error was.

We can test the value of ERL, the line at which the last error occurred, from within a program with IF. It would also be useful to be able to test the type of error that last occurred. We cannot do this with REPORT and so Acorn provided another variable, ERR, which, though set by the computer, can be tested with IF THEN . . .

Every error message has an associated error number. For example Syntax error's number is 16, Mistake's is 4. There is a full list of them on page 482 of the User Guide.

When an error occurs, such as a syntax error, its number is stored in the variable ERR – here ERR would equal 16 – and we can test the error number with IF THEN and carry out certain actions if a particular error occurs.

There is also nothing to stop us from re-joining our program if the error is not fatal, as Program II shows.

```
10 ON ERROR GOTO 60
20 REPEAT
30 INPUT"Type in a number"A
40 PRINT"This is your number"A
50 UNTIL FALSE
60 IF ERR=17 THEN PRINT"END of
Program":END
70 IF ERR=20 THEN PRINT"Number too
large try a smaller one":GOTO 20 ELSE
PRINT"There is a ";:REPORT:PRINT" at
";ERL:END
```

Program II

This sets up an infinite loop, lines 20 to 50, which waits for a number to be typed in and then prints it. If an error should occur execution transfers to the error handler from line 60 onwards.

If the Escape key is hit an error will occur, ERR will be set to 17 and line 60 will end the program – hitting Escape is "fairly fatal".

If ERR equals 20, the number you

→

input was too large, line 70 will tell you this and will then rejoin the main program at line 20.

It is thus possible to test the variables ERR, and ERL for certain errors, take action to correct the error and rejoin the program. Note that you cannot rejoin a procedure or GOSUB routine.

It is best to re-enter a program from an error at a single point which is the start of the main program loop and so on, such as line 20 in Program II.

Now type in Program I again and add the deliberate error in line 15:

```
15 This is a deliberate error
```

When run the program executes the error-handling routine at line 60, as before. This time also add line 12:

```
12 ON ERROR OFF
```

Try running the program again. Do not be surprised if the computer seems to have forgotten our error handler and issued its own error message as normal. ON ERROR OFF tells the computer to do just that.

This is useful because it allows us to debug the main program without our error handler taking over all the time.

> **‘An error in an error handling routine gives a micro the shudders’**

It has, however, one very important use about which most people seem to forget. Delete lines 10, 12 and 15 from our program and type in the following new lines:

```
10 ON ERROR GOTO 55
55 another deliberate error
```

Run the program and it will promptly hang up. Why? Because the error in the error handler makes the micro go to the error handling routine, and it encounters the error again which sends it back to the error handler ad infinitum.

We require the computer to report to us any errors in the error handler and not to execute an infinite loop. Delete line 10 and add the following ones:

```
10 ON ERROR GOTO 53
53 ON ERROR OFF
```

Line 53 makes the computer use its own error handler if errors occur in our error handler. It will thus stop and report the error that occurred and will not hang. ON ERROR OFF should be the first line in all error handlers.

That concludes our examination of the error handling facilities provided by Basic. Next month we will move on to examine how these facilities are provided by the computer. This will help us to structure our error handlers correctly and allow us to write an improved one to our own recipe.

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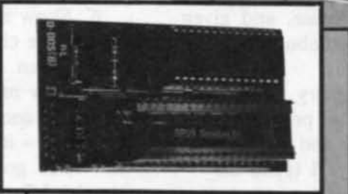

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All my own work

ALAN McLACHLAN sets out to write a games program from scratch

IT'S not often I get the opportunity or even the urge to make a literary contribution to the magazine, but this month, flushed with the success of Cast of Thousands in the May issue, I'm going to do a bit of programming.

I asked the lads in the office what I should write, and having thought better about Kevin's suggestion of a super-fast machine-code levels-and-ladders zap-'em-chase-'em mega-production, I decided to take Mike's advice and write something extremely simple. He must know me better than I thought!

I wanted a program that a beginner could follow easily, but, more important, one that I could write myself with very little help.

A couple of years ago I took a series of evening classes on Basic programming and one week the class, with the teacher, put together a very simple Minefield game which contained a lot of useful programming ideas. So that's what I'm going to try to put together now.

The idea was simple. There were a number of mines hidden in a square grid, and by entering X, Y coordinates, you attempted to find them all in the least possible number of goes. My work of art is a slight variation on that, consisting of a 10 by 10 grid of boxes in which are hidden 10 little faces that I've christened the Smileys.

You enter the coordinates of the square that you think one of these is in, column first, then row. If you choose correctly, the Smiley is displayed, accompanied by perhaps a suitable chorus of The Entrance of the Queen of Sheba or something similar.

Should you choose wrongly, you could be greeted by an ear-splitting raspberry or similar noise, and given clues as to the whereabouts of the nearest target.

Well, that's it in theory – the main problem is starting to program it. I thought for a while and came to a monumental decision – I typed in:

```
10 REM Al's Smiley Hunt
```

No mug this lad. If I don't manage to get the program working, at least I'll know what it's supposed to do.

Right, then, the first thing to do, and I don't know whether the experts do this, is to plan the program out on paper. So I wrote out a list of routines to carry out the following tasks:

1. Initialise arrays, variables and characters.
2. Show title, draw and set up grid.
3. Position Smileys.
4. For a set number of Smileys, take input, check and validate.
5. Check input against 3.
6. Show Smiley if correct.
7. Give clue if incorrect.
8. When all Smileys found, show how many guesses.

That's enough delay getting to the keyboard – it's about time we got stuck in. We're going to write the game in chunky Mode 5, so line 20 reads:

```
20 MODE 5
```

Now, I could have used subroutines to carry out all the tasks above, but I decided to use the BBC Micro's "procedures" as they are far more powerful, as you'll see later.

To achieve something resembling the above list, I laid out the program as follows:

```
30 PROCinit
40 PROCtitle
50 PROCgrid
60 PROCsmileys
70 REPEAT
80 PROCinput
90 PROCcheck
100 UNTIL smileys>9
110 PROCfinished
120 PROCresults
```

I thought for a long time how best to set up the two-dimensional grid and store values in the various squares. There are several ways of doing this, and by far the most efficient way to solve the problem – and we've covered it in our Beginners series – is the use of an array *box(9,9)*.

I have included this in the first procedure DEFPROCinit along with

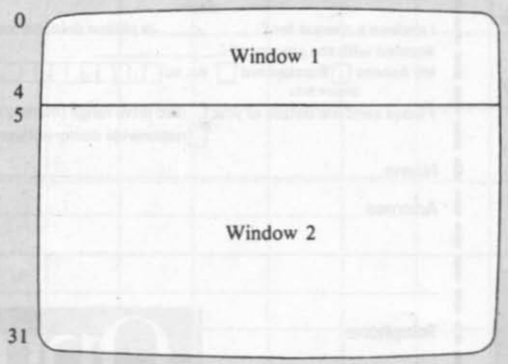
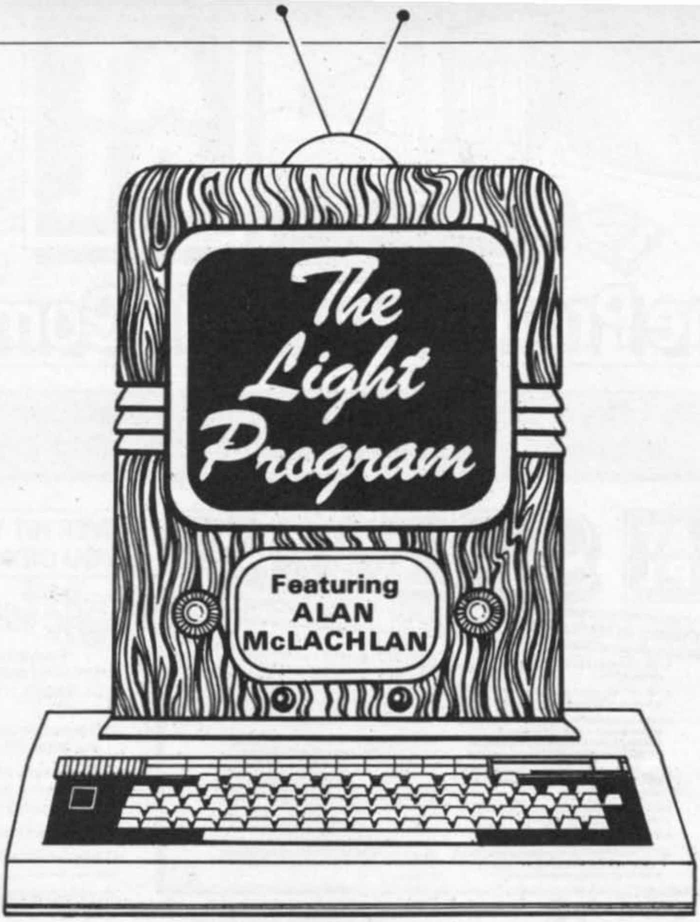


Figure 1



three VDU23 statements, one to turn off the cursor, line 160, and two to define new characters, lines 170 and 180.

There is also a REM statement at line 130. In fact there will be one at the start of all the procedures to make the program easier to read. The whole routine reads:

```
 130 REM*************************
 140 DEFPROCinit
 150 DIM box(9,9)
 160 VDU23;8202;0;0;0;
 170 VDU23,224,0,126,126,126,126,126
126,0
 180 VDU23,225,126,255,153,255,189,1
5,255,126
 185 ENVELOPE 1,1,50,-50,0,1,1,0,126
0,0,-126,126,126
 190 ENDPROC
```

The array reserves sufficient memory for 100 boxes, all accessible by the numeric variable *box*. The reason it is 100 locations and not 81 is that it allows for 0 as X and Y subscripts – the numbers in the brackets. You'll see why I have preferred to use the numbers 0-9 rather than 1-10 later, but for now just settle for the fact that it will be much easier in the long run.

It will make rather a nice display to split the screen into two parts, with the grid in one and the inputs in another.

Your micro steps in here with a facility to define a text window, but the difficulty I encountered was that I wanted to define two. I got round this by creating a procedure that would define two different text windows, but only one would be called at any one time.

The power of the procedure command comes into its own because I was able to pass five different parameters with it – *W* (the window number 1 or 2), *col, wx, wy* (the colour and X, Y coordinates of any text to be printed) and of course *A$* (the text itself).

I've called this procedure DEFPROCwindow. The windows are set up in lines 230 and 240, using the command VDU 28, conditional on the number assigned to the variable *W*.

We also want these two windows to have different background colours, window 1 = red, window 2 = black, and this will be done when PROCwindow is called.

```
 200 REM*************************
 210 DEFPROCwindow(W,col,wx,wy,A$)
 220 COLOUR col
 230 IF W=1 THEN VDU28,0,4,19,0
 240 IF W=2 THEN VDU28,0,31,19,5
 250 PRINTTAB(wx,wy);A$
 260 ENDPROC
```

The default logical colours in Mode 5 are Black (0), Red (1), Yellow (2) and White (3), and I'm going to keep it simple by sticking to these. You can, if you wish, change any of these to another of the BBC Micro's "actual" colours with a simple VDU 19 statement. This takes the form:

```
VDU 19,logical,actual,0,0,0
```

where the variable *logical* holds any of the Mode 5 logical colour numbers 0-4, and *actual* any of the actual colour numbers shown on page 224 of the User Guide.

During our game we are going to be using quite a few variables and where possible we'll try to give them names that mean something.

Two important variables are *turns*, which I've chosen to signify how many guesses we've had, and *smileys*, to indicate the total number of smiling faces we've found. It is important that these are re-set when the game is run again, and we'll do this in the next procedure, DEFPROCtitle.

```
 270 REM*************************
 280 DEFPROCtitle
 290 PROCwindow(1,0,0,0,""):COLOUR12
9:CLS
 300 turns=1:smileys=0
 310 PROCwindow(1,3,2,2,"Al's Smiley
Hunt")
 320 PROCdelay(2)
 330 ENDPROC
```

The reason I have not included them in DEFPROCinit is that I need to call this procedure at the start of each new game, to re-set the variables. I have only included in DEFPROCinit the items that need to be initialised once per game. In fact if you try calling DEFPROCinit again you'll generate the error "Bad DIM at line 150" – you just can't re-dimension arrays.

You'll also notice that I've created window 1 by calling PROCwindow for the first time in line 290, but because I only want to clear the screen I have passed zero in all the parameters except the first. PROCwindow in line 310 however passes all five parameters

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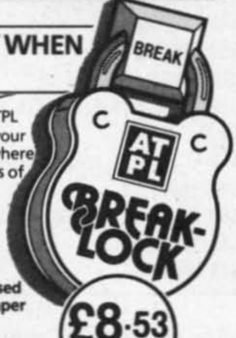

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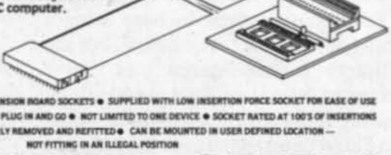

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From Page 99

because I'm printing the title of the game.

If you're anything like me and enjoy seeing your name on the screen, include your own version of A$ – be my guest, but don't you dare tell anyone you wrote the program on your own.

While I was writing the program I needed quite a few delay loops to create pauses. I decided to make a procedure out of these that could be called by one command, passing as the parameter the length of the pause. Line 320 calls this procedure – DEFPROCdelay – which is held in lines 980-1020. It creates a delay dependent on the digit contained in the variable *number*.

```
 980 REM****************************
 990 DEFPROCdelay(number)
1000 FOR delay=1 TO (number*1000)
1010 NEXT delay
1020 ENDPROC
```

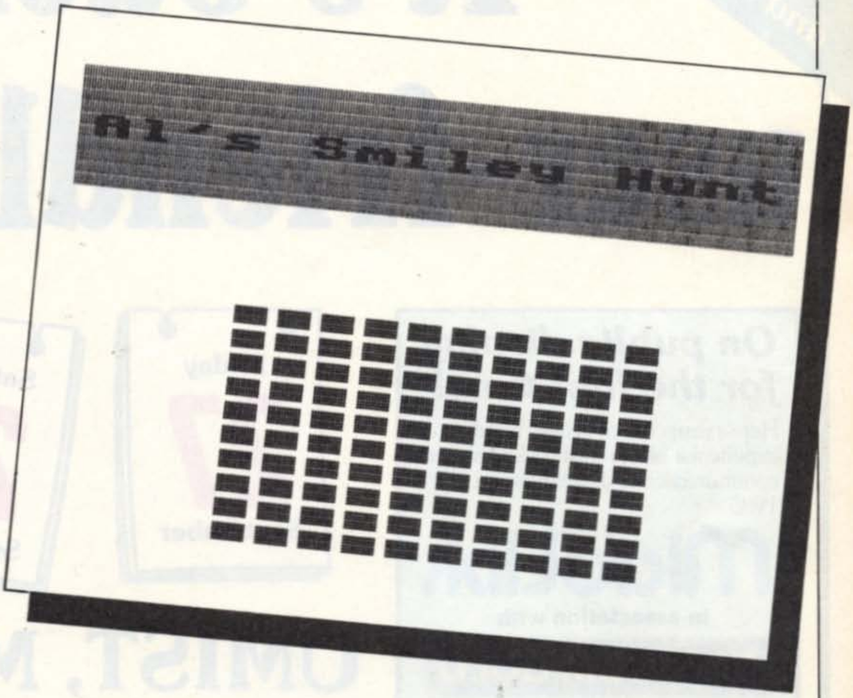
This completes the initialisation stage and if you look back at our list you'll see that the next job is to draw the grid of boxes. You could show these boxes as any character you wanted, but I've defined a simple shape in line 170 and tagged it CHR$(224).

To put this character on screen in the form of a grid, we simply create two FOR ... NEXT loops containing the start and end locations of the screen coordinates, then call PROCwindow again, passing the appropriate variables as parameters.

DEFPROCgrid, after clearing the screen to black, uses two

```
  340 REM**************************
  350 DEFPROCgrid
  360 PROCwindow(2,0,0,0,""):COLOUR12
8:CLS
  370 FOR boxx=4 TO 13:FOR boxy=7 TO
16
  380 PROCwindow(2,2,boxx,boxy,CHR$22
4)
  390 box(boxx-4,boxy-7)=0
  400 NEXT boxy:NEXT boxx
  460 ENDPROC
```

FOR ... NEXT loops to generate the X and Y locations of each box – *boxx, boxy*. The boxes are then printed on screen using PROCwindow, noting this time it is window 2 that is called, the lower one.


Al's Smiley Hunt

These FOR ... NEXT loops are also used to place 0s in all the locations in our array *box()* using line 390.

By the way, don't worry about the missing lines between 400 and 460 – we'll be putting these in next month.

Remember, if you are going to identify your NEXTs, you must put them in reverse order to the FORs, as in line 400. I didn't the first time I typed the line in, and got the error message "No FOR at line 400". You can avoid this slip by not identifying the NEXTs at all, but it makes it easier to read programs if you do.

You can check you've done this right so far by entering a dummy line as in line 55.

```
55 GOTO 55
```

Run the program and you should now see, in the lower window, 100 yellow boxes in 10 rows of 10 on a black background. If you haven't, check everything you've done so far very carefully.

Well, I think you've had enough for one session. Next month we'll put in the screen coordinates and look at how to hide the Smileys, progress on to the input routine, and check for any correct or incorrect guesses.

Who knows, we may even finish the game completely!

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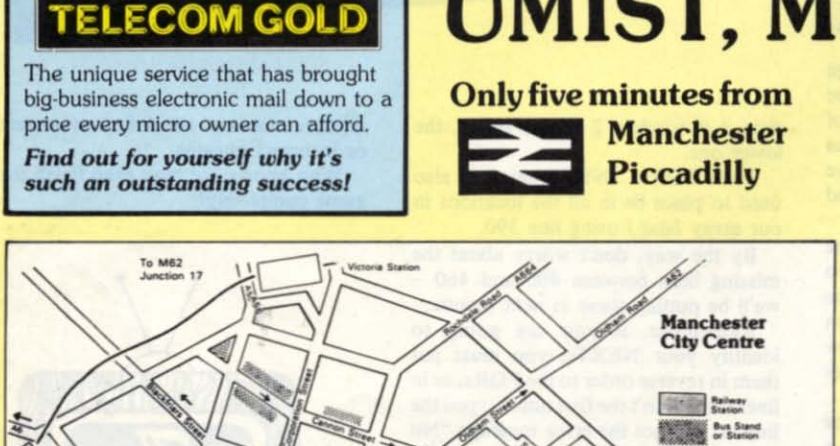
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Making a final, floating point...

PETER JOHNSON concludes his series on machine code programming using Basic's internal routines

IN the previous two articles in this series, I looked at how the Basic EVAL function and the various floating point routines could be used from machine code.

In this, the last article, I discuss some more of the floating point routines and one or two integer arithmetic routines. I then give listings of some of the simpler functions which can be included in your own programs.

The variable pointer at &4B,&4C was mentioned at the end of last month's article. The floating point number stored at the location given by this pointer is in Basic's packed format, the five byte representation used to store floating point numbers.

This is used as one of the operands. One of the floating point accumulators, *fpa1* or *fpa2*, is used as the other operand, if one is required.

Table I lists the addresses of the routines in Basic II and Basic I respectively which act on operands at &4B.

As an example of using these routines, suppose you had two floating point numbers whose addresses are stored at locations *var1* and *var2* respectively, and you wanted to multiply them. Figure I could be used.

	Basic II	Basic I
fpa1=(&4B)	&A3B5	&A3A6
fpa1=fpa1-(&4B)	&A4D0	&A505
fpa1=fpa1+(&4B)	&A500	&A50E
fpa1=fpa1*(&4B)	&A656	&A661
fpa1=fpa1/(&4B)	&A6E7	&A6F2
fpa1<=>(&4B)	&A4D6	&A4DE
fpa2=(&4B)	&A34E	&A33F
(&4B)=fpa1	&A38D	&A37E
(&4B)=(&4B)-fpa1	&A4FD	&A50B
(&4B)=(&4B)/fpa1	&A6AD	&A6B8

Table I

```
lda var2         Get address of
                 second operand in
                 &4B,&4C
sta varPtr       (&4B)
lda var2+1
sta varPtr+1     (&4C)
jsr ldfpa1       (&A3B5/&A3A6) into
                 fpa1
lda var1         Get first operand
                 address in &4B,&4C
sta varPtr       (&4B)
lda var1+1
sta varPtr+1     (&4C)
jsr mulfpa1      (&A656/&A661)
                 Multiply them
jsr stfpa1       (&A38D/&A37E) Store
                 the result in first
                 operand
```

Figure I

The addresses *var1* and *var2* might be entries in the parameter block at page &0600 if the operands were passed in a CALL statement. It's unlikely, however, that you would call a simple routine like this from a Basic program as it could be done so much simpler using something like $a=a*b$.

It's more likely to be useful when used from within a program which is almost totally written in machine code, but which needs access to floating point routines.

Originally, I planned to list the addresses of integer and string routines found in the Basic ROM. However, there are a couple of good reasons for not doing this.

First, most of the routines aren't easily called from outside Basic as they are deeply embedded in the expression evaluator.

Second, with a couple of exceptions, the integer and string routines are simpler to include directly in a program.

It is more instructive, therefore, if I give examples of such routines as listings, rather than just addresses in Basic.

There are three routines which are worth giving by address, though. These are integer multiplication, division and exponentiation. The routines are:

iac=iac*(&39)	&9D83	&9D60
iac=iac DIV (&39)	&99E8	&99C0
fpa1=fpa1^A	&AB12	&AB35

For the multiply routine, (iac,iac+1) and (&39,&3A) hold the two-byte unsigned numbers to be multiplied. Location &37 should be set to the EOR of locations iac+1 and &3A on entry – that is, the sign of the result. Location &27 should contain zero. The four-byte result is stored in iac.

The divide routine again takes its arguments from iac and &39, but this time they are both treated as four-byte numbers. In addition, locations &3D-&40 should contain zero.

On exit, iac contains the quotient and &39-&3C contains the remainder. Both quantities are unsigned, so if you want the proper sign, the operands must be examined before the division, and the result negated if required.

The sign of the quotient is positive if both operands have the same sign and negative if not. The sign of the

→

From Page 105

remainder is the sign of the iac before the division.

The final operation is part floating point, part integer. On entry, fpa1 contains a number to be raised to a power. The accumulator holds the power to which fpa1 is to be raised. This is a signed number, –1 is &FF. On exit, fpa1 contains fpa1^A.

The rest of the integer operations that you might like to use from machine code are probably short enough to include directly in the program. For example, multi-byte logical operations are very straightforward. In subsequent examples, the two operands are taken to be in iac and pointed to by *(varPtr)* for the left and right-hand sides respectively. A four-byte EOR would look like Figure II.

```
        ldy #3            Four bytes
                          to change
.loop   lda iac,Y         Get a byte
                          from lhs
        eor (varPtr),Y    Ex-or it
                          with rhs
                          byte
        sta iac,Y         Save result
        dey               Next byte
        bpl loop
        rts
```

Figure II

Note that we start from the MSB and work our way down. This doesn't matter with the operations EOR, AND and ORA because the order of the bytes has no significance. However, arithmetic operations must be performed in the order LSB to MSB. A four-byte ADD for example looks like Figure III.

```
        ldx #4            Used as a
                          counter
        ldy #0            Points to
                          current byte
        clc               Set C=0
.loop   lda iac,Y         Get lhs
        adc (varPtr),Y    Add in rhs
        sta iac,Y         Save result
        iny               Next byte
        dex
        bne loop
        rts
```

Figure III

These two routines illustrate different ways of using an index register to count in a loop. If you have something to do between 1 and 256 times, load the index register with the count – using 0 for 256. At the end of the loop, decrement it and do a BNE to the loop label. For example, to print 40 spaces:

```
        lda #ASC" "
        ldx #40
.loop   jsr oswrch
        dex
        bne loop
        rts
```

However, sometimes – like in the EOR example above – the counter is also used as an index which must have an iteration with the index set to zero. In this case, load the index register with one less than the number of bytes to be affected, and do a BPL at the end. For example, to set the four bytes of the iac to zero:

```
        lda #0
        ldx #3
.loop   sta iac,X
        dex
        bpl loop
        rts
```

This method can only be used for counts between 1 (X=0) and 129 (X=128). All other values will execute only once.

The NOT function in Basic can be coded very simply. There is only one operand, the iac, and the result is stored there:

```
        ldx #3
.loop   lda iac,X
        eor #&FF
        sta iac,X
        dex
        bpl loop
        rts
```

The unary minus – for example, in PRINT –10 – is similarly straightforward. As a change, though, we will not use a loop, but give each of *iac* bytes its own instruction. This uses more memory but is faster than using a loop. It is something Basic does a lot to speed calculations up.

This is the advantage of having a 16k Basic – you have the room to "expand out" loops like the one in Figure IV. Some of the earlier 8k Basics – such as on PETs, Apples and Ataris – were so tight for space that they couldn't even afford special integer routines. All arithmetic was done on real numbers.

```
        sec               C=1 for
                          subtract
        lda #0            lsb
        sbc iac
        sta iac
        lda #0            second byte
        sbc iac+1
        sta iac+1
        lda #0            third byte
        sbc iac+2
        sta iac+2
        lda #0            msb
        sbc iac+3
        sta iac+3
        rts
```

Figure IV

Although multiplication can be done by calling the addresses in the Basic ROM given previously, there are some special cases where it's much quicker to do it yourself.

In particular, multiplying by powers of 2 – 1, 2, 4, 8 and so on – can be performed using the shift left and rotate left instructions. The routine in Figure V multiplies the iac by 16 by shifting it left four times. This can be used in a hex string to binary routine.

```
.iac16  ldx #4            Shift each
                          byte left by
                          four
        lda iac           A bit faster
                          if A is LSB
.iac16L asl A             Do lsb
        rol iac+1         Next three
                          bytes
        rol iac+2         rol is used
                          to propogate
                          the
        rol iac+3         shifted off
                          bits
        dex
        bne iac16L
        sta iac           Don't forget
                          to save lsb!
        rts
```

Figure V

Note that a check for overflow could be made by putting the instruction:

```
bcs overError
```

between the *rol iac+3* and the *dex*.

Most of the newer 16 and 32-bit processors (such as the 68000 and 32016) recognise the importance of multiple shift instructions, and let you perform operations like the one above in just one instruction.

Other processors take this a step further and are armed with a special device called a barrel shifter on the chip which can do arbitrary shifts and rotates in one "cycle". Such a microprocessor is the AT&T 32000.

The routine in Figure VI uses iac16 to read a hexadecimal string from an area of memory called *strAce* and converts it to a number in iac. The string is terminated by any non-hex digit.

Two subsidiary routines are used. The *adjust* routine converts the Ascii character in the accumulator into a binary number in the range 0-15 and returns with the carry flag clear. If the digit was not a valid hex character, the carry flag is set on return. The routine *addDig* adds the digit in A to the iac.

```
.hexIn  lda #0           Init the iac
                         to 0
        sta iac
        sta iac+1
        sta iac+2
        sta iac+3
        tay              Y is pointer
                         into the
                         string
.hexInL lda strAcc,Y     Get the next
                         digit
        jsr adjust       Make digit
                         in range
        bcs hexInR       Non-hex, so
                         return
        pha              Save the
                         adjusted
                         digit
        jsr iac16        iac=iac*16

        pla              Add in the
                         next digit
        jsr addDig
        iny              Inc pointer
        bne hexInL       Always taken
.hexInR rts              Return with
                         result in
                         iac

.adjust sec              Start by
                         subtracting
                         ASC"0"
        sbc #ASC"0"
        bcc adjF         It was less,
                         so failed
        cmp #10          Was it 0-9?
        bcc adjR         Yes, so
                         success
        sbc #ASC"A"-10-ASC"0" Adjust
                         for letter
        cmp #10          Check it was
                         valid
        bcc adjF
        cmp #16          Set carry
                         for result
.adjR   rts              Return with
                         C=0 for
                         success
.adjF   sec              Return with
                         C=1 for fail
        rts


.addDig clc              Add digit in
                         A to iac
        adc iac
        sta iac
        bcc addDigR
        inc iac+1        Propogate
                         the carry
        bne addDigR
        inc iac+2

        bne addDigR
        inc iac+3
.addDigR
        rts
```

Figure VI

```
.iac10  jsr iac2         Iac times 2
        ldx #3           Save iac*2
                         on the stack
.iac10L lda iac,X        High bytes
                         first
        pha
        dex
        bpl iac10L
        jsr iac4         Iac times 4,
                         so times
                         eight in all
        clc              Now add
                         iac*2 to
                         iac*8=iac*10
                         X=&FF from
                         just now
        ldy #4
.iac10M inx
        pla
        adc iac,X
        sta iac,X
        dey              Next byte

        bne iac10M
        rts

.iac16  jsr iac4         Shift iac
                         left by four
                         bits
.iac4   jsr iac2         Shift iac
                         left by two
                         bits
.iac2   asl iac          Shift iac
                         left by one
                         bit
        rol iac+1
        rol iac+2
        rol iac+3
        rts
```

Figure VII

Finally, I present a quicker way of multiplying the iac by 10 than calling the general routine in Basic. This may be used in a routine for converting decimal strings into binary in a similar way to the *hexIn* routine above. The times 10 routine is shown in Figure VII.

Note the alternative way of coding *iac 16*. To make *hexIn* convert a decimal string instead of a hex one, change the call to *iac16* to *iac 10,* and alter *.adjust* as shown in Figure VIII.

In conclusion, I hope that in these articles I've shown that many of Basic's powerful features can be exploited by the machine code programmer if he doesn't mind restricting the "portability" of his programs.

On the other hand, many of the simpler functions can be called more efficiently by including them in the program itself.

```
.adjust cmp #ASC"0"      Is it less
                         than "0"
        bcc adjF         Yes, so C=1
                         on exit
        cmp #ASC"9"+1    Greater than
                         "9"
        bcs adjF
        and #&F          Convert to
                         binary
        rts              C=0 on exit
                         for success
.adjF   sec
        rts              C=1 on exit
                         for fail
```

Figure VIII

The choice is the programmer's. I hope that this series has made it clearer.

HELP is at hand for all the addicts who while away the hours in the local arcade, pumping coin after coin into the one-armed bandits.

Fruit Machine is a simulation of a typical game found in pubs and arcades, with both nudge and hold features. One big advantage over real machines, though, is that it doesn't cost anything to play.

There is also the added advantage of only having to press a key to spin the reels, instead of yanking on a lever.

The program uses Mode 2 multi-coloured graphics, that are stored in a string array, to represent the six fruits and symbols used. These symbols are: Bars, Bells, Cherries, Lemons, Plums and Grapes.

There are eleven of these symbols on a single reel. Each fruit is assigned a value in the R% array. This value is doubled or trebled to calculate your win, depending on whether there are two or three of the same symbol on the win line.

You start off with £1 and the cost of a spin is 2p. If you win over £5 the machine runs out of money and the game will end.

You might like to change some of these values, such as if you wanted to use the program for fund-raising in aid of charity.

You can in fact alter any of the following by changing the values in the appropriate lines.

The stake: Alter the figure in line 1440 (the value is in pounds), and also the figure in line 1530 to the same value.

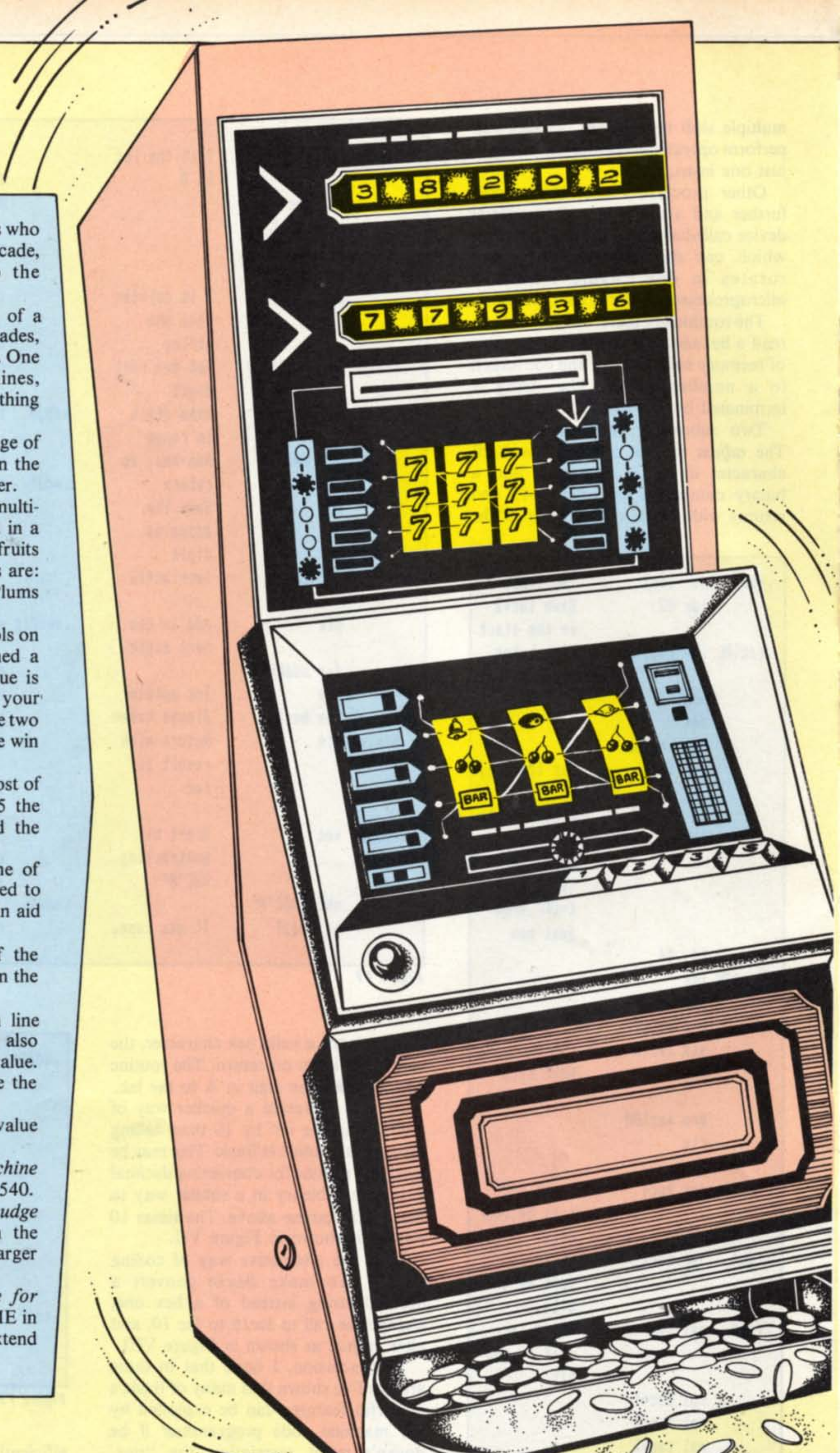
The value of the fruits: Change the values of R%(n) in lines 760-870.

Your initial credit: Change the value of the variable L in line 1170.

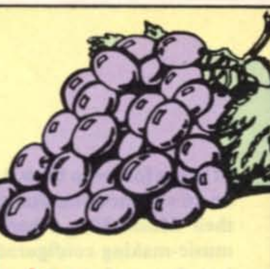
The amount of money the machine holds: Change the figure in line 1540.

The regularity of being able to nudge or hold: Change the number in the brackets in line 2630. Making it larger increases the odds.

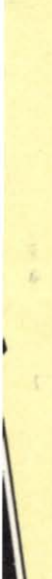
The length of time available for nudging: Change the value of TIME in line 3140. A greater figure will extend the time.



FRUIT MACHINE



Are you feeling lucky? Good, then take a whirl on MARCUS MASON's one-armed bandit



PROCEDURES

p(Q%,W%)	Prints out symbols on reel Q%, according to the value of W%.
spin	Spins the reels, by using a FOR . . . NEXT loop that calls PROCp(Q%,W%).
check	Returns M%. M% = 1 if you have won anything.
win	Calculates and prints your win, and then adds it to your credit.
delay(D%)	Waits for D% seconds.
scroll	Scrolls screen down, until the screen is blank, and plays tune.
features	Decides whether to nudge or hold. Returns N% and H%.
hold	Prints 'H' under the reels that can be held, makes a noise, and holds the reels that you choose.
nudge	Prints 'N' under the reels that can be nudged, makes a noise, and nudges the reels that you choose.
turn	Turns the reel you have chosen in PROCnudge.
FNans	Function that returns Y%. Y% = True or False, depending upon your input to a Yes/No question.

KEYS TO USE

1, 2 and 3	To nudge or hold any of the three reels if it is possible to do so.
S	Puts another coin in the machine, and ends the Hold procedure.

Disc users will have to set PAGE to &1100 before loading and running the program.

VARIABLES

R$(n)	String containing graphics for symbols. Example – PRINT R$(0) prints a Bar.
R%(n)	Value of symbol(n). Example – R%(0) = value of Bar.
H%(n)	Hold value of reel(n). 0 = Can't hold. 1 = Can hold. –1 = Held.
N%(n)	Nudge value of reel(n). 0 = Can't nudge. 1 = Can nudge.
H%	Hold flag. If H% = 1 then PROChold is called from the main loop.
N%	Nudge flag. If N% = 1 then PROCnudge is called from the main loop.
U%	Data read in the loop to define characters (450-500).
B$	String containing graphics for Bar.
C$	Cherries.
P$	Plum.
E$	Bell.
L$	Lemon.
G$	Grapes.
S$	Used in the part of the program that prints out the wins (580 to 710) to move the text cursor up a line, and then print a space.
L	Credit in pounds.
M%	Win flag. If M% = 1 then PROCwin is called from the main loop.
Q%	Selects reel to be printed in PROCp.
T%	Type of symbol on top line in PROCp.
U% and W%	Type of symbol on the Win line.
W%	Type of symbol on bottom line.
A%,B%,C%	Type of symbol to be printed on reels 1-3 when they stop spinning.
Y%	True or False depending on your answer to a Yes or No question in FNans.
N	Number to multiply with the value of the symbols on the win line to calculate win.
LI	Value of win (N×R%(n)).
D%	Number of seconds to delay in PROCdelay.
M$	Message to be printed at the end of the game.
A	Key pressed in PROChold or PROCnudge, either 0, 1 or 2.
J	Reel to turn in PROCturn.
DUMMY	Randomises the game.

A spectacular performance

GABRIEL JACOBS puts Acorn's Music 500 hardware/software system to the test

IT'S not for me to blow Acorn's trumpet on 16 channels simultaneously, but with their Music 500, a hardware/software music-making configuration, I could do just that, and much more.

In fact, if you want to make music with your BBC Micro, and you'll accept nothing but the best, Music 500 has to be your choice. And if you think £199 is high, then consider that you'll be getting not only a powerful synthesiser, but the equivalent of an eight-track mixing desk and sequencer, plus a brilliantly innovative programming language called Ample. More about that later.

Performance is nothing short of spectacular. With its stereo output, user-definable waveforms and fully programmable envelopes, and features such as ring and frequency modulations, synchronisation, signal inversion, offset and pseudo-random noise, Music 500 offers an astonishing range of high-quality timbres and tones, detuned effects, and pitch slides from wild glissandos to the most delicate vibratos.

With the software loaded, an unexpanded 32k BBC Micro can hold in RAM, in Mode 7, about 10 minutes of densely scored multi-part music – without counting repeats, common sections, and so on – which can be saved to tape or disc. With the new Model B+, or the Model B plus Aries, you can get even more, in any mode, and use an 80 column screen.

The synthesiser is housed in a standard BBC beige disc drive case. It takes its power from the mains, and has an on/off switch, an audio socket, and a ribbon cable which plugs into the 1mHz bus. The bus is not monopolised, however, for the synthesiser passes it on at the back of its case. A standard DIN lead (not supplied) links the unit to your own hi-fi.

The case can sit on either side of the micro, but if you have a second processor and a double disc drive you may have to put it underneath the latter, since the ribbon cable is of standard Acorn length – that is, very short.

A disc drive is not essential as the software is supplied on cassette. But life will be easier if you transfer Ample to disc with the utility provided.

In music, events tend to happen simultaneously. Ample, specifically designed for programming music, therefore starts from a basis of multi-tasking. Indeed, its dependence on interrupts means that it cannot be used with a 6502 second processor, which does not allow them.

Ample assumes a tree-structure playing hierarchy (see Figure I). Up to eight players can be assigned any of the eight available voices, and each voice one or more pairs of the 16 oscillator channels. All levels work concurrently, with each channel having independent control of pitch, duration, amplitude, envelope, waveshape and stereo position.

If you include chords in your score, or complex instrumental sounds each requiring several channels, the number of available players diminishes accordingly. But with some clever programming – say, assigning a player to another instrument while he's idle – you can create more than passable symphonic effects.

Note information is computed before it is played, so the software gets advance warning of any large chunks of work, such as creating a new Fourier-synthesised waveform, which it then handles with no interruption in the music.

Ample is more than just a language. It's a complete system of musical notation.

The many attempts in this century alone to produce a simpler method of notation than the one we know have all fallen on deaf ears – players of natural instruments are an extraordinarily conservative lot. So there's little chance that we'll all eventually be reading Ample's textual notation instead of sticks and blobs. But it could well revolutionise the scoring of electronic music.

A glance at Figure II will show you that notes are designated by letter name.

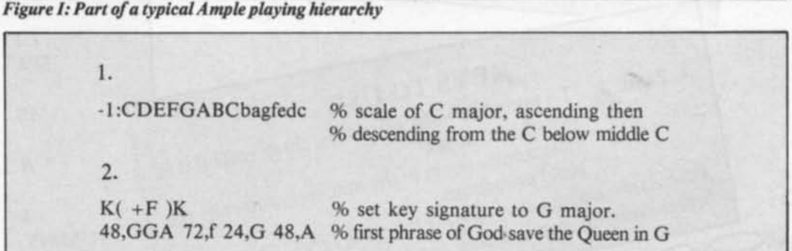


Figure I: Part of a typical Ample playing hierarchy

1.

```
-1:CDEFGABCbagfedc    % scale of C major, ascending then
                      % descending from the C below middle C
```

2.

```
K( +F )K                  % set key signature to G major.
48,GGA 72,f 24,G 48,A     % first phrase of God save the Queen in G

24,G/G/A/f//GA/           % alternative notation
```

Figure II: Examples of Ample notation. REMs follow the % sign

Upper case indicates a rise in pitch, and lower case a fall, with +, – and = for accidentals. Key signatures can either be ignored or pre-defined. Notes are octave-independent, though an octave can be set by a number plus a colon (zero for notes centred around middle C).

Duration is fixed in arbitrary time units followed by a comma, with the / symbol extending a note by its defined value. Rests are scored with ↑. Bar lines are optional, but if included, Ample will check bar length.

That's just the beginning. You can write complex polyphony, adjust tempi and dynamics and in fact score any musical function, normally with little fuss.

Admittedly, a conventional directive like rall (slow down) is easier to write that the series of numbers required in Ample for the same effect. But then Ample is more precise, and once a rallentando has been defined, it can be called repeatedly with a single command known as a "word".

Like Logo, Ample relies on such user-defined words, which can be incorporated into a program or used in immediate mode by simply entering their name.

They generate sounds, set the characteristics of instruments, select players, voices, channels, and so on.

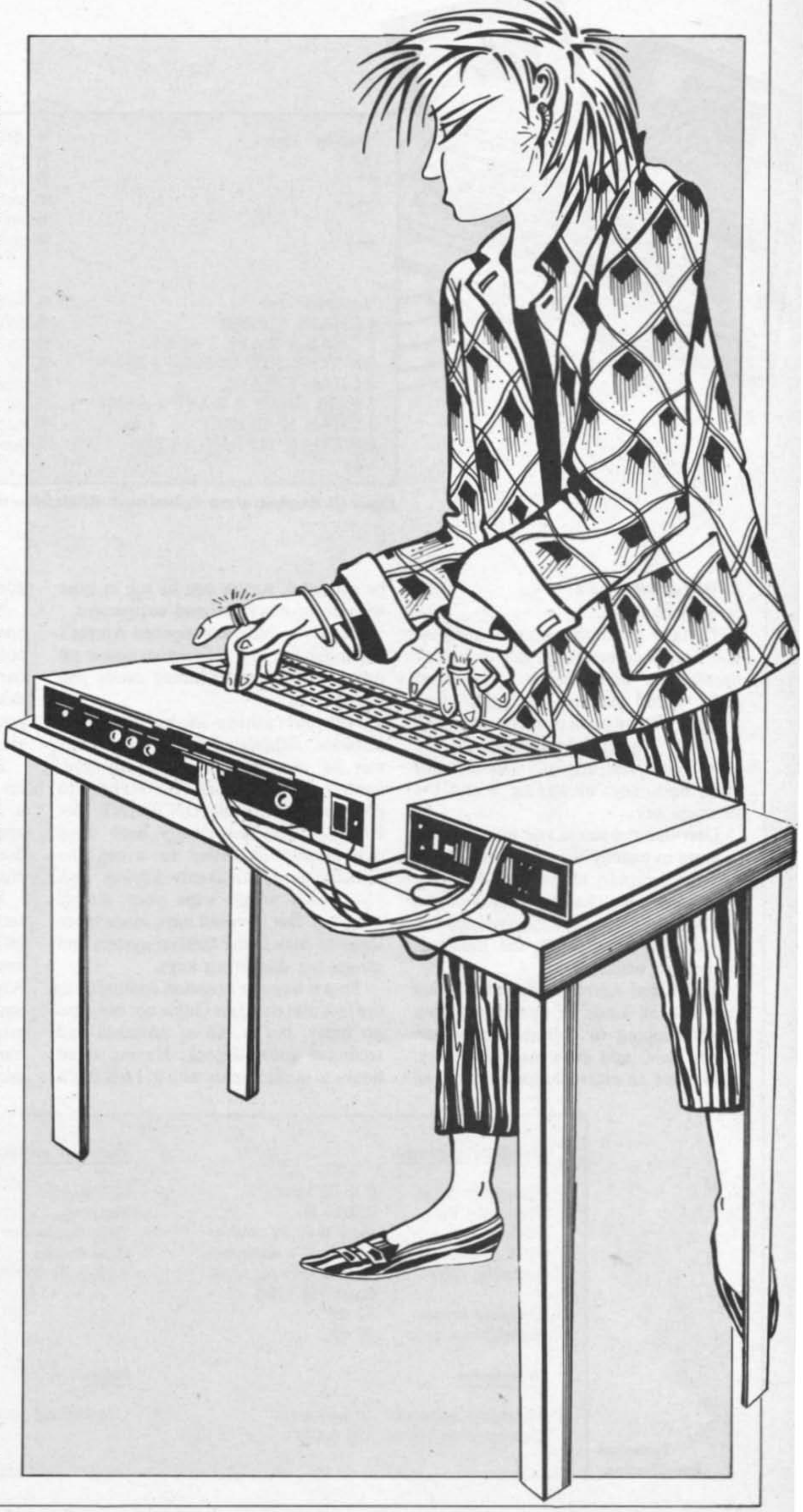
They can be edited separately in line-numbered listings, and are stored in a dictionary of up to 50 per program.

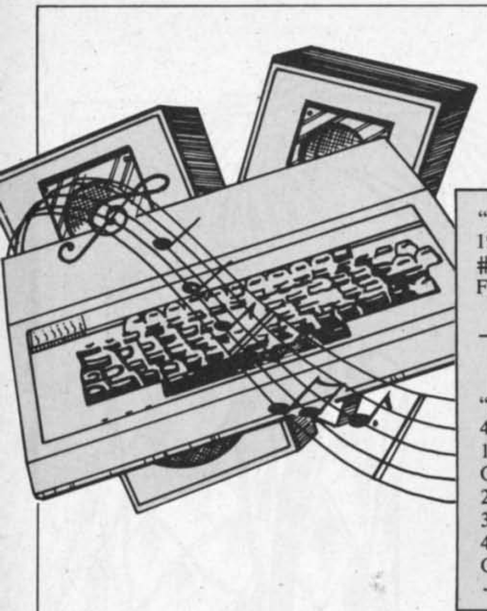
Repeats, codas, etc – the GOTOs of conventional musical notation – are handled by calling the appropriate word within FOR, IF/ELSE and REPEAT/UNTIL structures, all of which can also be applied to note sequences. Since words are designed to be nested within each other, the possibilities are endless.

One aspect of Ample many BBC users will be unfamiliar with is that, like Forth, it uses post-fix notation, sometimes called Reverse Polish (as in Warsaw, not Wax). This means that arguments precede commands, operators, etc. (2 3 + instead of 2 + 3).

It may seem perverse to enter 6 Mode instead of Mode 6, but the advantage of post-fix is that all procedures, functions, operators and commands have the same type of syntax. This allows Ample to be extensible, in that user-words are indistinguishable from those embedded

→





```
"skipbar" ←                          % define word and open procedure.
192                                  % number of time units per bar.
#*                                   % multiply by n (number of bars).
FAST                                 % embedded AMPLE word meaning skip.
                                     % number of units preceding it.
→                                    % close procedure.


"basspart" ←                         % define word.
4 CHANS SOUND                        % define wave, amplitude.
1 CHAN 4 WAVE 5 AENV                 % and pitch envelopes, etc.
ON SYNC 5000 OFFSET 1 PENV           % for fuzzy main sound.
2 CHAN 3 WAVE                        % bright, phased.
3 PAIR CHAN 2 WAVE 4 AENV            % percussive slap at.
4 CHAN 20 OFFSET                     % extreme right stereo.
ON CHAN 115 AMP −3 POS               % position.
→
```

Figure III: Examples of user-defined words. REMs follow the % sign

From Page 111

in the language.

To take a simple example, suppose you need a command to skip n bars of music. You would define a command word called perhaps "skipbar" (see Figure III), and put it into a function key (*KEY). Then, while listening to the music, you can instantly fast-forward eight bars, say, by keying 8 and the function key.

User-defined sound and music words operate in exactly the same way. They allow you rapidly to create and modify riffs, envelopes, harmonic waveforms and so on, so that prototype sounds can be altered either while the music is playing or while frozen.

Embedded Ample commands, which facilitate all kinds of operations from single-stepping to panning across the stereo field, add even more flexibility. And since an external clock signal can be accepted, Ample can be run in sync with drum machines and sequencers.

Once you have experienced Ample's expandability and interactive power no other way of programming music will satisfy you.

Not everything is perfect. For instance, although BBC * commands can be used at the Ample prompt, control codes (such as ˆB, ˆN) have to pass via Ample itself (ON PRINT, ON PAGE). This has clearly been done deliberately in order to avoid the possibility of mistakenly keying, say, ˆV, which would wipe your Ample program. But it would have made more sense to stick to the familiar system and screen out dangerous keys.

That is a minor irritation compared to the fact that the User Guide not only has no index, but is full of mistakes and technical gobbledegook. Having spent hours to make friends with it, I still feel it doesn't want to know me.

Such criticisms must be seen, however, against a myriad of plus points. After using a demo Music 500 for a couple of weeks without exhausting even a proportion of its potential, I'm certain that nothing else available will now suit me.

Hybrid Technology, which produces the Music 500 for Acorn, is working on a ROM Ample and a four-octave synthesiser keyboard. More information from Unit 3, Robert Davies Court, Nuffield Road, Cambridge.

I suspect we shall also soon see a range of add-ons from other firms (ATPL already produce a compatible keyboard), and feature articles on using Ample, both for beginners and professional musicians, as *the* music programming language. Together with its hardware companion, it deserves the widest recognition.

Technical Specifications

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Amplitude control: logarithmic

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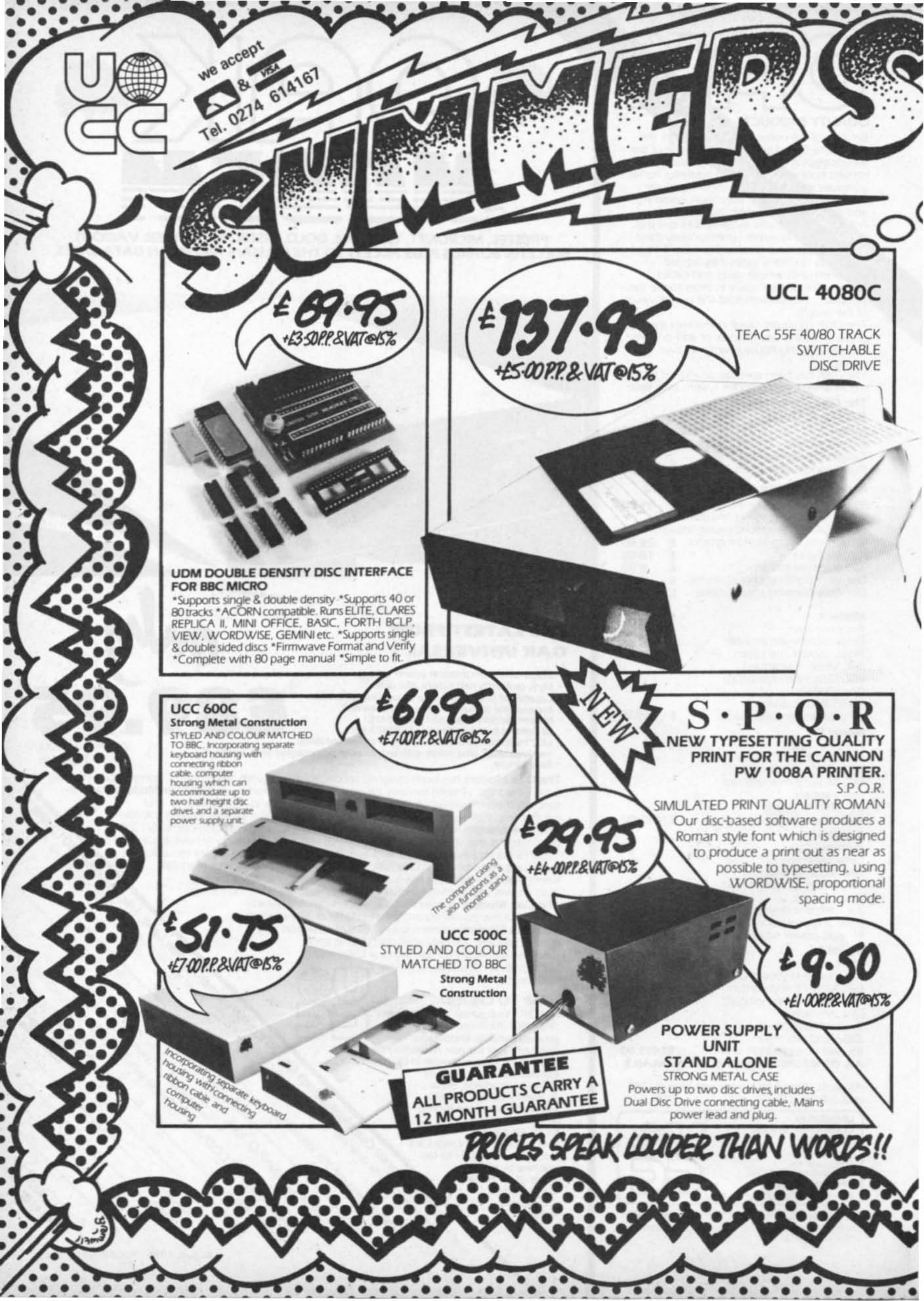
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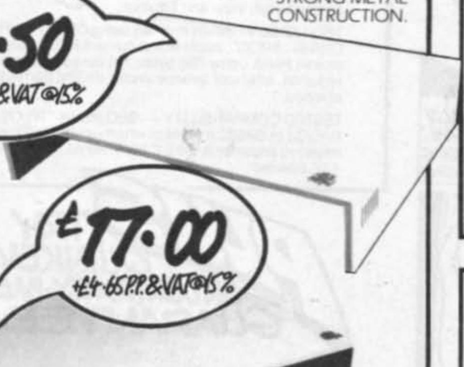

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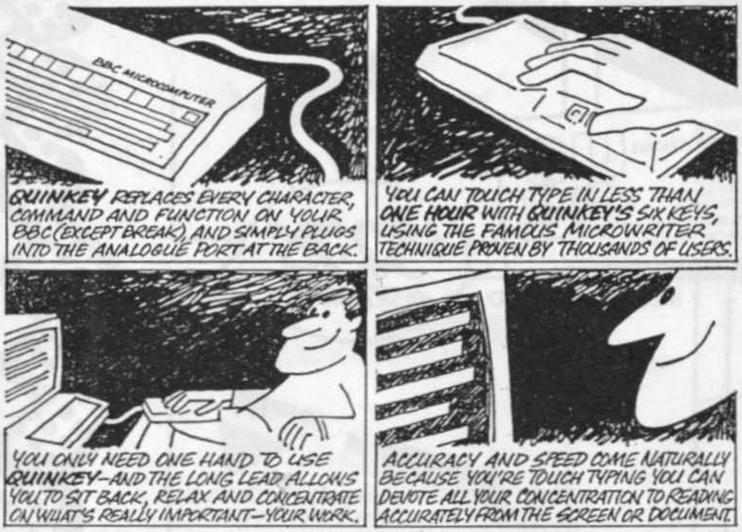
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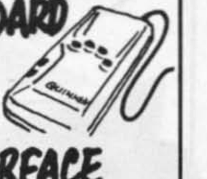

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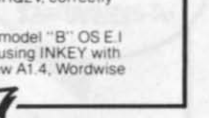

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PROBLEM PAGE

Your technical queries answered by MIKE COOK

Public warning is a puzzler

I WAS forced to change over from the immensely-satisfactory Amcom DFS to the Acorn DNFS in order to get bored with Elite (incidentally, could I just mention how extremely helpful the people at Pace were during this, and a couple of other crises). This seems to have produced an unusual problem.

After the machine has been on for a small amount of time, say 10 minutes, whenever I try to load from disc the error message "Public" is generated. If I try to auto-boot, the same message replaces the word "Basic" in the top left-hand corner. The machine hangs up and the disc drive searches eternally.

I phoned Acorn and they said that this was a new one on them, denying all knowledge of this particular error message, and suggesting (shudder) that I take my BBC to my dealer to put on test.

However, as I have the Solidisk 32k sideways RAM, I am able to replace the DNFS with my trusty Amcom, or even Solidisk's own STL0E00 DFS.

The machine then appears to work perfectly, suggesting to me that the problem lies in the Acorn DNFS.

Is this true? What can I do about it? What does "Public" mean anyway? Is it something to do with the network filing system?

Besides the Solidisk and DNFS I have View 2.1 and the 1.2 OS.

You're my last hope – none of the computer know-alls round here has a clue. – *Graeme MacArthur, Horsforth, Leeds.*

● Yes, it's a new one on me as well. The word Public is being generated by the Econet system telling you that the file can be accessed by anyone on the network.

As the disc and Econet both use the non maskable interrupts (NMI) then maybe some of your non-standard stuff is fooling the software into thinking that the NMI was generated by the network system. However, this is only a guess.

As to a cure, try the Watford single density DFS that works with Elite and has no network system in it.

No place for a RAM

IS there any reason why an 8k RAM chip should not be fitted to one of the three vacant ROM sockets? I do not have a ROM extension board.

I would like to be able to load utilities from disc as required. – *S. Thornton, Ilkley.*

● The reason why an 8k chip cannot be fitted is that there are no read-write signals going to the sockets. ROMs don't need to be told what to do as they have no choice.

You could fit the extra signal lines and decoding logic needed, but it is messy.

You are better off fitting a sideways ROM card – most of these have the facility for extra RAM.

By the way, 8k RAMs are called HM6264P (or similar) and cost about £24, but no doubt Watford will have them cheaper.

Flipping PAGEs

MY BBC B has DFS0.90 and OS 1.20, which I have had for four/five months, and I am completely lost as to the PAGE command.

A few examples of what I have come across may help with sorting out my problem.

1. The Argus bi-monthly cassette magazine tells users with a DFS to set PAGE to a particular hex value. Why?

2. Two other cassettes tell users to set PAGE at other values with or without a DFS. Why these?

3. Your good selves, on page 13 of the Mini Office booklet, quote another set of numbers. Why?

I have looked through the User Guide (particularly pages 500/2) and am still as ignorant as I was before I looked – one can understand your many readers who struggle with the guide.

I have calculated the following figures (approximate of course because of the string and numeric variables as well as arrays) for my machine with Acorn DFS:

Mode	Memory	Memory with Acorn DFS
7	25342	24277
5	16126	15061
4	16126	15061
0.1.2	5886	4821

Further columns could be made of the various DFSs on the market (preferably by you, who are in a position to know) which I am sure would be of help to many.

Why, oh why, do not programmers state the approximate byte memory at the head of their programs, so that the ignorant like me do not land up with NO ROOM errors after long laborious typing sessions.

It would be nice to be forewarned.

In the meantime perhaps you could tell me about the relationship between program length and the PAGE hex numbers? – *Bert Conway, Upper Norwood.*

● The computer only has 32k of memory to allocate to all its tasks.

The video display wants some, the Basic program wants some to be in and some more to store its variables. The Basic language wants some to work in and the operating system wants some as well.

In addition to this, any extra sideways ROMs can also claim some.

So the machine must have some way of allocating memory to all that need it.

If there is no more memory to allocate, you will get NO ROOM or suchlike.

Now if you have discs the disc filling system wants some room to work in – like sideways ROMs it is allocated memory starting at &E00. This is the address value. If you don't like hex you can call it 3584.

Memory addresses start at 0 and go to 65,535. Anyway the memory from &E00 is up for grabs by any sideways ROM and is allocated on power up or Ctrl + Break.

After these ROMs have had their say, then Basic can start using the memory to store program lines in. The address of this point is held in a variable called PAGE.

So the higher PAGE is set, the less room you have for your program.

Some programs are so large that there is not enough memory to take them all (along with the screen mode they need and the storage they use).

In these cases we have to steal some of the memory back from the sideways ROMs.

To do this, we reset the variable PAGE. Of course when this happens the sideways ROMs will no longer function.

Some ROMs can have a little memory reclaimed and are still able to do some of their functions, but not all.

Therefore when you are advised to reset PAGE you are getting extra room for your program.

Remember PAGE is the address of the first character of

→

IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 153.

From Page 119

your program and should only be reset if you know what the consequences will be or you are instructed to do so by the writer of the software.

There is little relationship between the length of a program and the setting of PAGE as you cannot tell how much extra memory will be needed by the variables or by the Basic stack.

This is a tricky thing to calculate and I know of no one who does this.

Portion of hot chips

I OWN a BBC Model B (issue 7 circuit board) with OS 1.2 and Basic 2 fitted. I have also added a Computer Concepts Graphics ROM (socket nearest the right hand edge of board).

Unfortunately I am experiencing problems with overheating. The problem manifests itself after approximately 1-2 hours' use and produces problems such as program hang-up, spurious carriage returns and occasionally recurrent "Bad address" error messages appearing on the screen.

The latter two occur without interaction by me and without a program in memory.

I have found that removing the lid cures the problem immediately and thereafter for another 1-2 hours, hence my assumption of overheating.

Any suggestions as to how I can cure this irritating problem? – *Stewart L. Rowbotham, Poynton, Cheshire.*

● It seems that some machines are more prone to this than others. If the problem occurs within four hours even with the lid off there seems little point in trying to improve the ventilation or drill holes in the top.

The problem might just be one chip being poor when hot.

You could try to identify this by going around with a hairdryer heating up individual chips till you found one that stopped it.

Alternatively you could get it malfunctioning and spray some cooler on the chips until it started working again.

Finally you could try swapping chips from a known good machine.

The main suspects are the operating system ROM, the 6502 processor or the memory chips.

Machine code book

I HAVE a BBC Model B and would like to learn how to write machine code. However, there are so many books on the market it is difficult to know what to choose.

I know very little about machine code, but have a good knowledge of Basic.

I was thinking of spending about £12 although I would spend more.

I would consider buying a simple beginner's book – Assembly Programming Made Easy, by Ian Murray is what I consider a simple book – and then a more advanced guide.

Please also recommend a beginner's assembler-disassembler progam. – *Andrew Rowlands, Normanby.*

● Recommending books is rather like recommending ale – each person has his own taste and gets on better with different styles.

It all depends upon what you want to use the machine code for.

A very good book is Creative Assembler, by J. Griffiths (pub. Penguin/Acorn).

This concentrates on the sort of machine code you will need when writing arcade video games. It is good value as well at £5.95.

It is a good idea to relate machine code to a topic as it gives you something to do with your new skills.

The book by Ian Murray is good. His style is to use a train and shunting yard analogy for all he does – you may find this helpful or frustrating depending upon your taste.

I do not think you need an assembler as there is already one built into the BBC Basic. As to a disassembler, you will only need this if you are trying to "crack" other people's code, so this is not necessary.

What might help you is a machine code monitor. This will allow you to view memory and registers as well as single step through your program seeing exactly what effect it is having.

I have used Exmon from BeeBug software. It's in a ROM and is quite useful. We published a monitor in *The Micro User* some months back so that's for free.

Coaxial link for monitor

Do you know of any way I may extend the distance between a BBC computer and a Microvitec 1431 monitor?

The problem is that we wish to set up an electronic noticeboard in the entrance hall of the school, driven by a computer in the computer room about 30 metres away.

With a normal four-core plus earth cable, much signal degradation is present, as may be expected.

I have contacted Microvitec but they are unable to help. – *A. Young, Worthing High School.*

● To get a video signal over 30 metres with normal four-core cable is pushing things rather. While I have not tackled this problem myself, here is how I would go about it.

First I would try to use co-axial cable – you would need four of these, one for each signal.

I would make a small adapter box at each end with a six-pin socket just like the RGB output so that normal leads could be plugged into each end.

You could try using the sort that is used for TV down leads, but you might have to resort to a real low loss cable (all TV shops claim they use low loss).

A good low-cost one is Uniradio 202. Trade rate for this is about £14 plus VAT per 100 metres.

This is hopefully all you need to do, but if the quality is still not as good as you want I would then build into the adapter boxes at each end a line driver and line receiver.

These are ICs requiring a power supply of +5 and –5 volts and are about £3 each. You only need one IC to handle the four signals.

If you do try any of this, let me know how you get on.

A Tandon in tandem?

I'VE had a "bog standard" Acorn 100k 40 track drive for a year. It's an Olivetti-made unit powered from the BBC supply.

Now I've bought a reconditioned Tandon TM100/4 80 track unit and a separate twin outlet PSU.

My question is – Can they be run together? So far I've not had any success except in running them singly.

In attempting to daisychain them I've put the Olivetti as the last drive, assuming it would take address 1 (O/2 being the Tandon addresses).

As the TM100 has no resistor teminator pack fitted and the Olivetti has (though I can't identify one) I assumed this would be the necessary sequence of connections.

On the TM100 I set the programmable shunt switches (DIP) as 1 and 2 ON, 3 to 8 OFF. That is head select and NSD0 links "made" (Using it singly I have link 6 also "made" – Mux).

Having fitted a keyboard DIP switch on the BBC, I selected 1 and 3 On with 2 and 4–8 Off.

The result is with power to Olivetti from BBC, the TM100 is constantly running until the BBC is powered On, then it stops.

Any attempt to access a disc in either drive results in both drives being selected simultaneously (LEDs on) – apparently as Drive 0 but giving Drive Fault messages.

Am I attempting the impossible in a quest for a cheap upgrade to 40/80 track operation? – *R.F. Pearson, Northwich.*

● It is possible to run two drives like this. However, you have to set the switches correctly.

The drive address a disc takes is nothing to do with the connector it is attached to. It is selected by the program switches. It looks like you have not got that right.

The Mux option needs to be on both drives.

As to the other switches, they vary from drive to drive, so you will have to find out from your supplier.

Finally, both motors should run when any drive is selected, but if a motor is running whenever it is connected up the fault is usually that the cable is connected upside down.

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Don't break up your Adventure...

Just string along with me, says SHINGO SUGIURA

ADVENTURES are becoming increasingly popular and even beginning to be as popular as the more conventional arcade-style games. The BBC's Basic, with its incredible speed and powerful string-handling facilities, is particularly suitable for writing reasonable adventure games.

One of the first problems that is encountered when writing an adventure game in Basic is avoiding any breaks in words in the description of each room.

The most obvious solution to this problem would be to pad out the appropriate data statements with spaces so that the words do not get split across lines. However this method is time-consuming, tedious and a waste of memory.

The second solution is a routine which would take a string and print it letter by letter, forcing a carriage return at the appropriate points so that no words are split over lines. Although this isn't difficult in theory, I've had to write it in machine code for speed and compactness.

First type in Program I carefully and save it before you run it. This is very important, since any mistakes in the source code could, and probably will render it useless. Now run it. If it has been typed in correctly, it should print some typical adventure descriptions in the new easy-to-read format.

To use the routine in your own programs all you have to do is include lines 120 to 770 at the end of your program and include the command PROCassemble near the beginning.

10-40	REM statements.
50	Selects Mode 7.
60	Calls the procedure which assembles the main machine code routine.
70-110	Demonstration.
120-150	Basic procedure which allows you to access the machine code routine without "dipping" into machine code.
160	Start of procedure which assembles machine code.
170	Reserves space for the machine code routine and the words.
180-200	Defines constants.
210	Start of machine code.
240	Sets up the Y register to point to just before the start of string to be printed.
260	Sets up the X register to point to the beginning of a word.
280-290	Increments pointers.
300	Gets a character from the string.
310	Sees if it is the end of the string. The end of the string is marked by a carriage return.
320	If it is, exit from loop.
330	Sees if it is a space.
340	If it is, exit from loop.
350	Stores the character in a buffer. This process is repeated until a space or the end of string is reached so that one word is built up in the buffer.
360	Goes back for more characters.
380	Stores the length of the current word.
390	Finds the current cursor position.
400-420	Adds the length of the word.
430-530	Is it more than 40? If it isn't, prints the word, otherwise forces a new line.
540-550	Checks to see if the end of the string has been reached.
560-570	If it hasn't, goes back for more, otherwise forces a new line and exits to Basic.
580	Prints the word stored in the buffer.
590	Sets counter to zero.
600-660	Prints the word character by character.
670-750	Finds the current horizontal cursor position by calling OSBYTE with the accumulator set to &86. The Y register must be preserved on the stack since it is used as an index in the main loop to get a character from the string.
760	End of machine code.
770	End of this procedure.
780-820	Example data statements.

```
   10 REM String Format routine
   20 REM By Shingo Sugiura
   30 REM (C) The Micro User
   40 REM
   50 MODE7
   60 PROCassemble
   70 REPEAT
   80 READ A$
   90 IF A$<>"END" PROCsplit(A$)
  100 UNTIL A$="END"
  110 END
  120 DEFPROCsplit(string$)
  130 $string=string$
  140 CALLprint
  150 ENDPROC
  160 DEFPROCassemble
  170 DIM code 100,print_buf 20
  180 oswrch=&FFEE:osbyte=&FFF4:osnew
l=&FFE7
  190 string=&700
  200 length=&70:pos=&71
  210 FOR pass=0 TO 2 STEP2:P%=code
  220 [OPT pass
  230 .print
  240       LDY #&FF          \Set up Y
 register to point to the start of st
ring
  250 .justify
  260       LDX #&FF          \Set up X
 register to point to the start of a
word
  270 .buffer
  280       INX               \Incremen
t pointers
  290       INY
  300       LDA string,Y      \Get one
character from the string
  310       CMP #&D           \Is it th
e end?
  320       BEQ end_os        \If it is
, go to "end_os"
  330       CMP #32           \Is it a
space, ie end of a word?
  340       BEQ end_os        \If it is
, go to "end_os"
  350       STA print_buf,X  \Store th
e character in temporary buffer
  360       BNE buffer        \Go back
for more characters
  370 .end_os
  380       STX length        \Store th
e length of string
  390       JSR getpos        \Find the
 current horizontal cursor position
  400       LDA pos
  410       CLC
  420       ADC length        \Add the
length of the word to be printed
  430       CMP #40           \Does it
go off the edge?
  440       BCC no_eol        \No, so g
o to "no_eol"
  450       JSR osnewl        \Yes, so
force a newline
  460       BNE no_space
  470 .no_eol
  480       LDA pos
  490       BEQ no_space
  500       LDA #32           \Print a
space to separate word
  510       JSR oswrch
  520 .no space
  530       JSR printword     \Print th
e word which is stored in buffer
  540       LDA string,Y      \Check if
 it's the end of the string
  550       CMP #&D
  560       BNE justify       \No, so g
o back for more words
  570       JMP osnewl        \Yes, so
force a newline and back to Basic
  580 .printword
  590       LDX #0            \The foll
owing routine is used to print a
  600 .wordloop
  610       LDA print_buf,X  \word whi
ch is stored in a temporary buffer
  620       JSR oswrch
  630       INX
  640       CPX length
  650       BNE wordloop
  660       RTS
  670 .getpos
  680       TYA               \This rou
tine finds the current horizontal
  690       PHA               \cursor p
osition by setting accumulator to &86
  700       LDA #&86          \and call
ing OSBYTE
  710       JSR osbyte        \On exit,
 X register contains the cursor posit
ion
  720       STX pos
  730       PLA
  740       TAY
  750       RTS
  760 ]NEXT
  770 ENDPROC
  780 DATA "You are in the Goblin's D
ungeon. There is a window high above
you, out of your reach."
  790 DATA You are inside the kitchen
 of the white house. A table seems to
 have been used recently for the prep
aration of food. A passage leads to t
he west and a dark staircase can be s
een leading upward.
  800 DATA You are in a field surroun
ded by myriad of plants and there is
a water fall to the west.
  810 DATA You are behind the white h
ouse. A path leads into the forest to
 the east. In one corner of the house
 there is a small window.
  820 DATA END
```

Program I

Now every time you want to print a string in the new format you have to include a line in the form:

PROCsplit (A$)

where A$ is the string you want to print. Of course the machine code routine may be used in your own machine code adventure games.

The program may seem ridiculously large for what it does, but in fact the actual object code takes up less than 100 bytes. As it stands there is only one statement per line, padded out with spaces. This is purely for cosmetic reasons and, since memory is at a premium, it would be a good idea to use multiple statement lines and get rid of the indentations to squash the source code.

Alternatively, for those who have a little knowledge of how to call machine code routines, it may be better to include the source code in a title page program and include the procedure *Split* in the main program. In this way you would lose very little memory.

The routine takes the string word by word, calculates what the horizontal cursor position would be if it were printed on the current line, and, if this is greater than the screen width – which would be 40 in Mode 7 – a new line is forced and the word is printed.

The Basic procedure *Split* simply stores the string to be printed in an area of memory easily accessible to the machine code routine, then calls the routine. The string is stored in the input buffer – Page 7 – but this should not cause any problems.

Brighten your colour ...in a FLASH

GRAHAM WALKDEN tells you how to extend your palette range

THE Amstrad computer has a useful command, INK x,y,z which will change colour x to a flashing combination of y and z. Although the BBC Micro has a limited palette of flashing colours there are many combinations which are not possible, such as flashing blue/white.

This program will allow the user to change any colour to a flashing combination of any two others.

The flash routine is activated by using the operating system command, *LINE. The syntax is as follows:

```
*LINE x,y,z
```

as you can see it's similar to the Amstrad command. Note that x is an actual colour and y and z are logical colours.

Type in Program I as it appears in the listing. The machine-code is assembled below PAGE so doesn't affect program memory area on tape and disc systems alike. When you have finished entering the program save it in case something happens to the listing when the machine-code is assembled.

When any typing mistakes have been rectified, test the routine by changing to any mode other than 7 and type *LINE with your own parameters. If you want Flash to remain in memory, don't use any of the function keys as the machine-code is assembled in the function key area.

You can alter the spacing between flashes by changing the value of the variable *delay* in line 370 to any value between 1 and 255 – 1 being the fastest.

Flash uses two main techniques to intercept the operating system. These are events and vectors.

Events are machine-code routines pointed to by the event vector EVENTV at location &220. The locations are called when a set condition, such as when a key is pressed, is met, no matter what the computer is doing.

The event is turned on using the *FX14,x command where x is the condition to be met. The event that our program uses is number 4, the start vertical sync – screen raster at origin. The routine is between lines 360 and 950.

The event driven routine reads the data for the flashing colours in the flash table – see later – then uses VDU19 to change the actual colour to one of the two logical ones. There is a flash location which contains either 1 or 0 depending on which flash colour is in operation.

Lines 410-500 see if Mode has been changed during the interval between flashes and if it has it resets the flash table for the current logical colours. This is done in lines 790 and 930.

Lines 530-670 perform the VDU19 by accessing the data table.

Vectors are RAM locations which point to the address of OS ROM routines. Altering these locations allows the redirecting of the operating system routines.

The first vector to be used is the user vector, USERV. The lsb of the address to jump to is &200, and the msb at &201. USERV is used to point to the address the machine must jump to when *LINE is called.

*LINE <string> is an operating system command which can be used by the programmer for almost any purpose. When the command is called, the machine jumps to the address as explained before with the registers in the following condition.

A – 1
X – lsb of address of string
Y – msb of address

When the machine is reset, the USERV is set up to call the "Bad command" error at location &E310.

There is an associated command, *CODE x,y which is used to pass variables to machine-code pointed to by USERV. When this is called the registers are set as follows:

A – 0
X – variable 1 (x)
Y – variable 2 (y)

This would appear to be more suitable for our program than would *LINE, but unfortunately only two variables are allowed, instead of the required three.

To solve this we must write our own routine to extract the three numbers from the string passed by *LINE.

MEMORY MAP

Several sub-PAGE locations have been assigned as variables and pointers. These are:

&70-&8F	Flash data table.
&F8, &F9	Vector for flash table.
&39F	Jump value for VDU19 table.
&3A0	Temporary address for the Y register.
&3A5	Counter for flash delay period.
&3A2	Flash counter – Set to 0 or 1.
&355	Mode number*.
&3A3	Temporary address for the accumulator.
&360	Number of logical colours per mode minus 1*.
&3A6	Corrected number of logical colours.
&3A1	Last Mode.

* *Actual operating system location.*

The routine to process the string of parameters is between lines 60-350.

Lines 100 and 110 check if *LINE was called. If *CODE was called instead, the "bad command" routine is called.

Line 130 sets up a "mini vector" for the flash data table.

Lines 160-200 load the parameters from the string.

Lines 240-280 is the "load parameter" search routine.

Lines 300-330 store the parameters in the flash data table.

The function of the routine is to decode the string of parameters and store them in the flash data table in the zero page locations &70-&8F. The table is constructed like this:

The locations are grouped in pairs, each pair corresponding to the two flashing colours. The location for colour 0 is &70 and the locations increase in steps of two for each successive colour, so colour 15 is at &8F.

Vectors are also used to turn off the event. When Mode is changed or the screen is cleared, the clear screen routine stops when VDU19 is called. To combat this, lines 1000 to 1060 turn off the routine if the CLS code (CHR$12) is printed.

This allows the screen to clear and automatically restarts the routine.

The routine re-vectored is OSWRCH (Operating System WRite CHaracter) which handles all the screen printing. The vector is at locations &20E and &20F.

```
   10 REM Flash.
   20 REM By Graham D. Walkden.
   30 REM Syntax - *LINE x,y,z
   40 REM (c) The Micro User
   50 *FX13,4
   60 FORopt%=0TO3STEP3
   70 P%=&A00
   80 [OPTopt%
   90 .line
  100 CMP#1:BEQok
  110 JMP&E310
  120 .ok
  130 STX&F8:STY&F9
  140 LDA#0:STA&39F
  150 LDA#&70 MOD 256:STA&92:LDA#&70
DIV 256:STA&93
  160 LDY#0:JSRload
  170 STA&39F:CLC:ADC&39F:STA&39F
  180 JSRload
  190 JSRstore:JSRload
  200 JSRstore:LDA#0:STA&3A2:STA&3A3
  210 RTS
  220 .load
  230 LDA(&F8),Y:TAX
  240 INY:LDA(&F8),Y:CMP#44:BEQout
  250 CMP#13:BEQout
  260 CLC:SBC#47:CLC:ADC#10
  270 INY:INY:RTS
  280 .out TXA:CLC:SBC#47:INY
  290 RTS
  300 .store
  310 STY&3A0:LDY&39F:STA(&92),Y
  320 INC&39F:LDY&3A0
  330 RTS
  340 ]
  350 NEXT:?&200=line MOD 256:?&201=l
ine DIV 256
  360 a%=P%+2:FORopt%=0TO3STEP3
  370 P%=a%:delay=25:?&3A3=0:?&3A1=9
  380 [OPT opt%
  390 .start CMP#4:BNEret1
  400 PHA:TYA:PHA:TXA:PHA
  410 LDA&355:CMP&3A1:BEQnoclr
  420 STA&3A1:LDA#12:JSR&FFE3:LDA#32:
STA&3A4
  430 .noclr INC&3A5:LDA&3A5:CMP#dela
y:BNEout1
  440 LDA#0:STA&3A5
  450 LDA&3A4:CMP#32:BNEnowipe
  460 LDA#0:STA&3A4:LDA&355
  470 CMP#2:BEQwipev16
  480 CMP#1:BEQwipev4
  490 CMP#5:BEQwipev4
  500 CMP#0:BEQwipev2
  510 JMPwipev2
  520 .nowipe LDX#0:LDY#0
  530 .loop
  540 JMPnojp
  550 .ret1 JMPret2
  560 .wipev16 JMPwipe16
  570 .nojp
  580 LDA#19:JSR&FFE3:TXA:JSR&FFE3
  590 LDA&3A2:CMP#1:BNEfl1
  600 LDA&70,Y:INY:INY:JMPfl2
  610 .fl1 LDA&71,Y:INY:INY
  620 .fl2
  630 JMPnooutv
  640 .out1 JMPout
  650 .nooutv JSR&FFE3:LDA#0:JSR&FFE3
:JSR&FFE3:JSR&FFE3:JSR&FFE3
  660 LDA&360:STA&3A6:INC&3A6
  670 INX:CPX&3A6:BNEloop
  680 JMPnov
  690 .ret2 JMPret
  700 .nov
  710 LDA&3A2:CMP#1:BNEnot1
  720 LDA#0:STA&3A2:JMPfin
  730 .not1 LDA#1:STA&3A2
  740 .fin
  750 .out PLA:TAX:PLA:TAY:PLA
  760 .ret RTS
  770 .wipev2 JMPwipe2
  780 .wipev4 JMPwipe4
  790 .wipe16
  800 LDY#0:LDX#0
  810 .lp
  820 STX&70,Y:STX&71,Y:INY:INY:INX
  830 CPX#15:BNElp
  840 JMPnowipe
  850 .wipe4 LDA#0:STA&70:STA&71
  860 LDA#1:STA&72:STA&73
  870 LDA#3:STA&74:STA&75
  880 LDA#7:STA&76:STA&77
  890 JMPnowipe
  900 .wipe2
  910 LDA#0:STA&70:STA&71
  920 LDA#7:STA&72:STA&73
  930 JMPnowipe
  940 ]
  950 NEXT
  960 oswrch=?&20E+(?&20F*256):a%=P%+
2:FORopt%=0TO3STEP3
  970 P%=a%
  980 [OPTopt%
  990 .debug
 1000 CMP#12:BEQnoexit
 1010 PHA:INC&3A3:LDA&3A3:CMP#1:BCCno
fx
 1020 TXA:PHA:TYA:PHA:LDA#14:LDX#4:JS
R&FFF4:PLA:TAY:PLA:TAX:PLA
 1030 JMPoswrch
 1040 .noexit PHA:TXA:PHA:TYA:PHA:LDA
#13:LDX#4:JSR&FFF4:LDA#0:STA&3A3:PLA:
TAY:PLA:TAX:PLA
 1050 JMPoswrch
 1060 .nofx PLA:JMPoswrch
 1070 ]
 1080 NEXT
 1090 ?&20E=debug MOD 256:?&20F=debug
 DIV 256
 1100 ?&220=start MOD 256:?&221=start
 DIV 256
 1110 *FX14,4
 1120 c=0:FORi=&70TO&8E STEP2:?i=c:?(
i+1)=c:c=c+1:NEXT
```

Program I

CHALICE

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THE BEEB BODY BUILDING COURSE

Part 29

MIKE COOK shows you how to latch on to the Bucket Brigade Delay Line and . . .

Beef up your sound!

LOOK, I know you have glanced at the circuit diagram before getting down to read this – if you hadn't before you will have now – so thanks for starting. Despite it looking complicated, it is reasonably simple, so let's see what it does.

The sound output from the BBC Micro is quite good when you consider it is simply a square wave generator. The complex envelope command can squeeze quite a variety of sounds from the simple hardware.

However, the small loudspeaker inside the computer does not do the sounds justice. You can simply add an external speaker or feed it through a hi-fi amplifier to get better results. But the sound is still a little "thin", especially when playing a single note, so this month and next we will look at ways to beef up the sound.

There are two ways of tapping the sound on the computer.

The first is to use the connector PL16 which is situated about two inches up from the bottom left-hand corner of the board.

You will see two solder points surrounded by a yellow line. The one higher up the edge of the board is the earth and the other is the signal. You can solder a length of screened cable to it to feed into an amplifier. If you like, you can put a socket on the case so you don't have your computer permanently attached.

The signal from this point is about 30mV so it needs to go into the low input level of your amplifier. If the auxiliary input to your amplifier needs more than this, you can tap the sound signal at the second point. This is where it leaves the board to go to the loudspeaker.

Simply remove the existing socket and place your lead on the two points. This will give you about two volts of audio signal and will be more than sufficient for most amplifiers. This point can be connected directly to any large loudspeaker and will give you a louder and more rounded sound.

Good though these improvements are, a more-pleasant sound can be coaxed out of the system if we add a little sound processing to the signal before we amplify it.

One effect that is used whenever sounds are recorded professionally is reverberation. This "thickens up" the sound, making it more warm and pleasant.

If you glance at Figure I you will see the block diagram of the reverberation unit we are going to look at this month.

Basically the output sound is derived from mixing the original input sound together with sound that has been delayed. There is a gain control to allow you to control the amount of delayed sound you add. Furthermore, the delayed sound can be fed back to the input and thus delayed again. This will produce a sort of short echo.

The delay is quite short, lasting only about 20ms, so don't expect long echoes. But by suitable adjustment of the feedback gain control you can make it sound like you are in a very big bathroom, with its attendant flattering acoustics.

The delay unit adds a high-frequency whine to the signal, hence the need for a low pass filter after the delay.

The vital component in this is the delay and one of the few devices capable of producing it is the TDA1022 Bucket Brigade Delay Line. Quite a colourful name, but it describes exactly how it works.

Remember those films of Dickensian London or Hardy's Wessex? When there was a fire, the locals formed a human chain, passing buckets of water from one to the other to give a continuous supply of water to the fire.

Well, if you think about it, there is a delay between the water leaving the river and arriving at the fire. That is just how the TDA1022 works, only instead of water being passed it is an electric charge and the buckets are capacitors. So any voltage at the input will fill up the first capacitor to a level proportional to the size of the voltage.

When the delay circuit receives a clock pulse it is the signal to "all change" and the charge is passed into the next bucket. The first bucket is then refilled, only this time to a different level if the input voltage has changed.

Some time later, that bucket of charge is dumped out of the output of the device where it flows through a

→

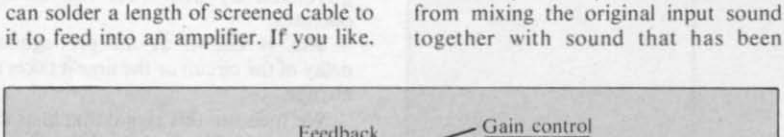

Figure I: Block diagram of reverberation unit

From Page 127

resistor to be converted into a voltage again.

So, you see, the length of delays depends upon two factors. Firstly, how often you give a clock signal to get the charge transferred, and secondly how many buckets are in the line.

The TDA1022 has 512 stages and the signal moves through two stages at every clock pulse. As the signal is chopped up into time slices we are limited to how fast the signal can change.

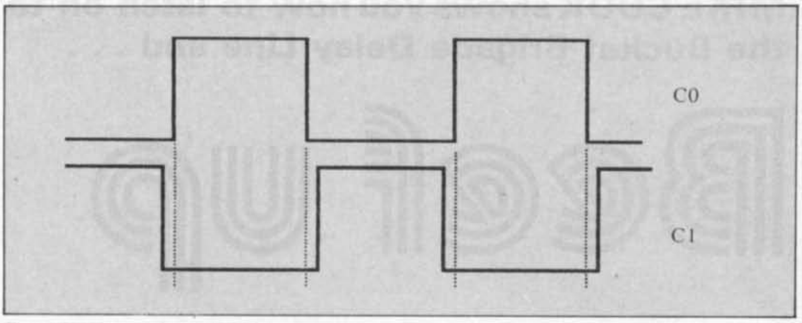

Figure II: Non-overlapping clocks

The rule of thumb for this is that the signal must not be higher than half the clock rate. This is known as the Niquis Criteria and is named after that famous French mathematician Charles Criteria.

We say the signal is sampled, but note as the charge is an analogue quantity the signal is not split into distinct levels, or quantitised, as it would be if we used an analogue to digital converter.

There is a frequency component added to the signal at the clock rate due to this sampling and that is where the low pass filter comes in. We could clock the delay so fast that this signal would be inaudible to all but a passing dog, but then the delay would be very short, so instead we clock it at about 10kHz and have a filter to cut out the whine.

Strictly speaking, we should also filter the input to the delay circuit to prevent any aliasing – that is, spurious low frequency signals. However, in practice there is little effect in the situation we will be using and so it can be safely omitted.

The only complication from using the TDA1022 is that it requires a two-phase non-overlapping clock. Now this is shown in Figure II.

Basically it comprises two clock signals C0 and C1. When one signal is up, the other is down, the point being that both signals must not be up at the same time. In fact the TDA1022 is driven with a low-level clock, so we actually need a clock where the two phases are never zero at the same time – the inverse of Figure II.

A non-overlapping clock can be achieved by using an edge triggered D-Type Flip Flop. This has six connections and is shown in Figure III.

Basically the flip flop will transfer the logic level on its D or data input to the Q output when a rising edge reaches the clock input. A rising edge is the transition from a logic zero to a logic one.

There is also an inverted output which is known as Q bar. This will always be the opposite logic state of output Q.

There are two other signal inputs – Set and Reset. Set will set the Q output to a logic one and Reset will make the Q output a logic zero. This will happen when they are active or at a logic one. They can therefore over-ride the logic state of the device at any time.

If we take a D-Type Flip flop and connect the Q bar output to the D input, every clock pulse will cause the Q output to change its state. This is because, whatever state it is in, the Q bar output is feeding the opposite state to the input and, with every clock pulse – on the rising edge – the input is transferred to the output.

When a circuit changes state at every clock pulse it is said to be "toggling". If you think about it, the output represents a frequency of half the clock input so we have a "divide by two" circuit.

Now if we take the two inputs of a toggling D-Type Flip Flop we have a two-phase clock, but, as the two outputs change at the same time, we will not have a non-overlapping clock. To get this we need to force both signals to zero just as they are changing. This we can do with a resistor and capacitor delay in conjunction with another flip flop.

Now look at the full circuit in Figure IV. We shall break it down into a number of sections, so we can see what is going on.

First the two gates of IC1 together with R1, R2 and C1 form the clock oscillator. This is just the same as we used in the high precision digital voltmeter in the April issue of *The Micro User*. This is fed into IC2 which contains two D-Type Flip Flops.

The D input is permanently tied to a logic one, so that, when this is clocked, Q goes to logic one. However, as soon as it does it gets reset to zero as the reset input is connected to the Q output.

R3 and C2 ensure this signal stays on long enough to effect the reset. However, the time between the Q output going high and it going low again is governed by how fast the circuit operates.

This is known as the propagation delay of the circuit or the time it takes to change.

We then use this signal that lasts the propagation time to blank out our two-phase clocks. These are provided by the second half of IC2 connected as a toggling flip flop. Each signal passes through two NAND gates of IC1.

With a NAND gate, if any input is a zero then the output is a one. Thus the two clock outputs are driven high during the time the flip flop is changing over and ensure the non-overlapping clock

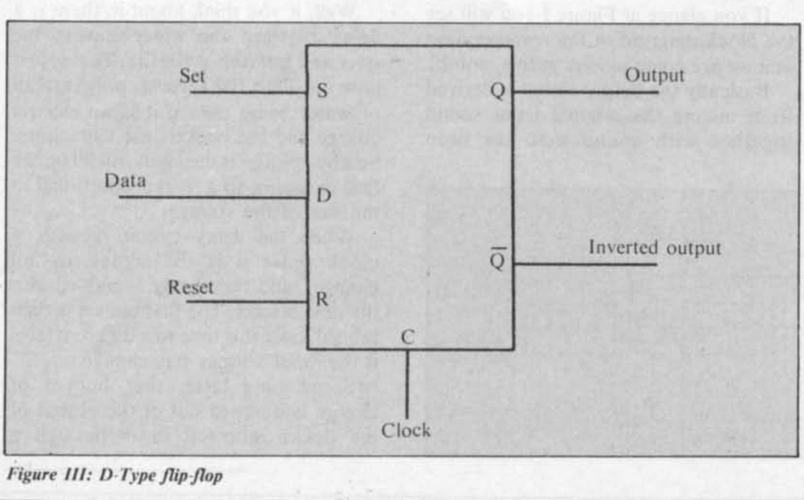

Figure III: D-Type flip-flop

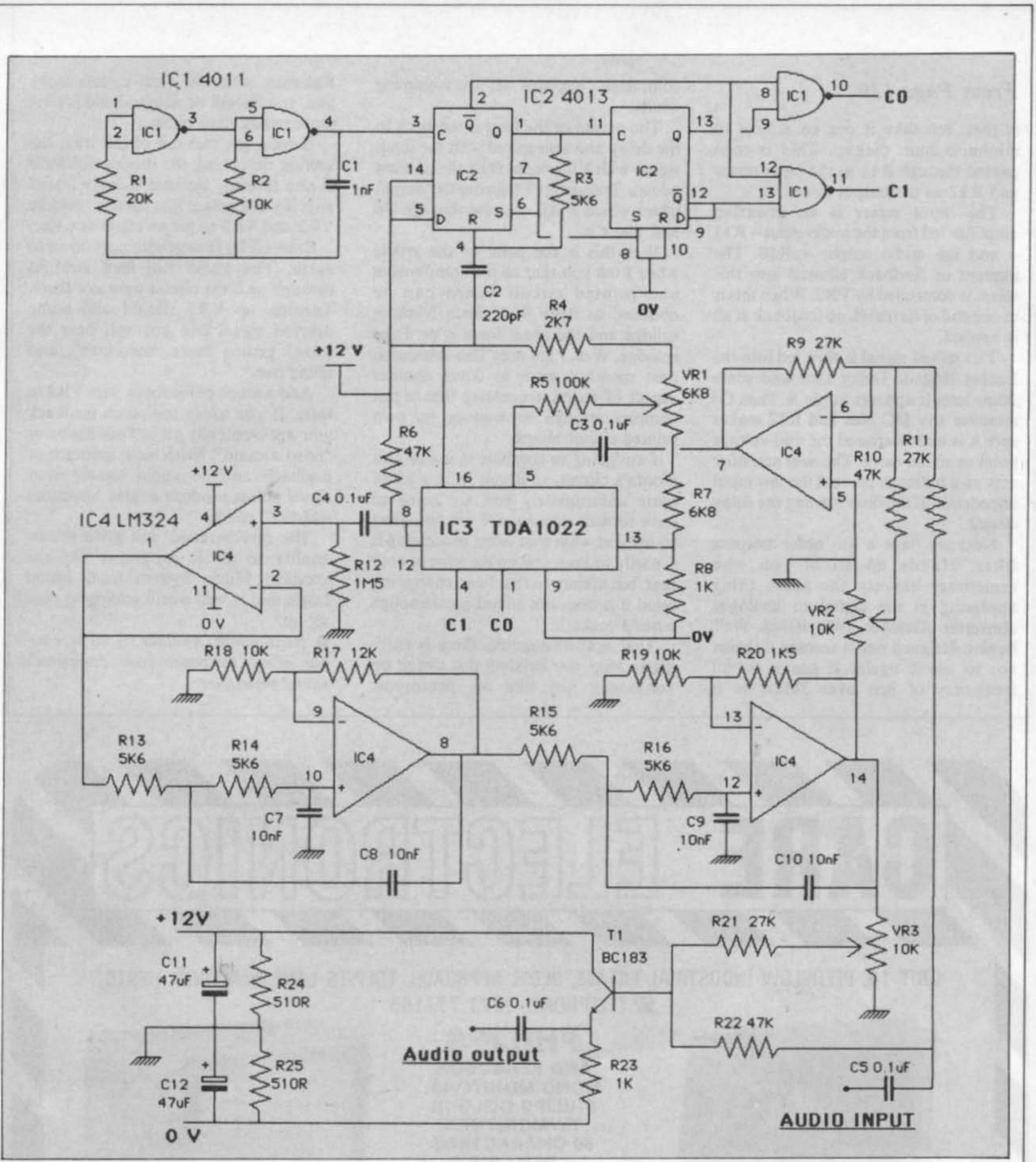
IC1 4011
IC1
R1 20K
R2 10K
C1 1nF
IC2 4013
IC2
R3 5K6
C2 220pF
0V
+12 V
R4 2K7
R5 100K
VR1 6K8
C3 0.1uF
R6 47K
IC3 TDA1022
R7 6K8
R8 1K
C1
C0
R12 1M5
C4 0.1uF
IC4 LM324
+12 V
IC4
R9 27K
R10 47K
R11 27K
VR2 10K
R18 10K
R17 12K
R19 10K
R20 1K5
R13 5K6
R14 5K6
C7 10nF
C8 10nF
R15 5K6
R16 5K6
C9 10nF
C10 10nF
+12V
C11 47uF
C12 47uF
R24 510R
R25 510R
0 V
T1 BC183
C6 0.1uF
Audio output
R23 1K
R21 27K
VR3 10K
R22 47K
C5 0.1uF
AUDIO INPUT

Figure IV: Reverberation circuit

we need. The clock signals C0 and C1 should be connected to the TDA1022 – the lines are missed out on the diagram for clarity. That circuit needs all the clarity it can get!

So the resistors R4 to R8 provide the bias voltages needed by the TDA1022 and VR1 is used to adjust the DC level of the input signal to get even clipping of signal peaks. If you do not have an oscilloscope, then adjust this for minimum distortion. This will only occur on large signals anyway, so the setting is not very critical. About halfway will do.

Now we come to the signal processing part of the circuit. This is done by a single IC – an LM324. This has four operational amplifiers inside it and we have used it many times in the past.

In order to run this off a single supply rail, we need to generate a mid-voltage point to act as a signal earth. This is done by R24 and R25 with C11 and C12 providing the smoothing.

This mid-point is shown with the earth symbol and must not be confused with the zero volts line which is usually shown as earth.

C5 acts to AC couple the audio input which should be taken from the speaker socket. The other wire from the speaker should be taken to zero volts. It already

→

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is that, but take it out on a wire to minimise hum pickup. This is then passed through R11 as the input mixer and R22 as the output mixer.

The input mixer is an inverting amplifier fed from the audio input – R11 – and the audio output – R10. The amount of feedback allowed into this mixer is controlled by VR2. When this is at one end of its travel, no feedback at all is applied.

This mixed signal is then fed into the Bucket Brigade Delay Line and some 20ms later it appears at pin 8. Then C4 removes any DC bias and R12 makes sure it is biased around the mid-voltage point or signal earth. The next amplifier acts as a buffer to prevent the low input impedence of the filter loading the delay circuit.

Next we have a 4th order lowpass filter. Hands up all of you who remember exactly the same thing appearing in the digital to analogue converter (October 1984 issue). Well, having designed one it seemed a shame not to use it again. It has a cut-off frequency of just over 3kHz, so it completely removes all the sampling whine.

The output of the filter is fed back to the delay and also mixed with the input signal with VR3 controlling the amount added. Transistor T1 forms the output mixer which is AC coupled through C6 and that's it.

Well this is the point of the article when I tell you that all the components and printed circuit board can be obtained as Body Build Pack Number splidge and the order form is on Page splodge. Well, I am not! This is because next month I want to cover another aspect of sound processing that is not complex enough to warrant its own printed-circuit board.

I am going to combine that with this month's circuit, so if you want a kit of parts unfortunately you are going to have to wait. However, I am not going to tell you what that extra processing is – partly to keep you on the edge of your seat, but mainly so that I can change my mind if it does not sound good enough when I make it.

That notwithstanding, there is nothing to stop you building this circuit on veroboard just like my prototype. Knowing what the final circuit looks like, you should be able to build it a lot more neatly than mine.

Having got that out of the way, the section describing the driving software is also missing, because it doesn't need any. In operation you simply twiddle VR2 and VR3 to get an effect you like.

Start off by having both pots down to earth. The audio will feed straight through as if the circuit were not there. Turning up VR3 should add some delayed signal and you will hear the sound getting more "luxurious", and filling out.

Add a touch of feedback with VR2 to taste. If you apply too much feedback you will eventually get self oscillation or "howl around". With large amounts of feedback and no audio signal, stray signal noises produce a faint "phantom whistler" effect.

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● *Next month: Another signal processing effect to boost your computer's sound repertoire.*

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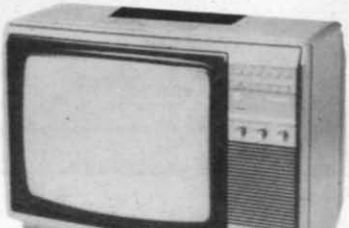

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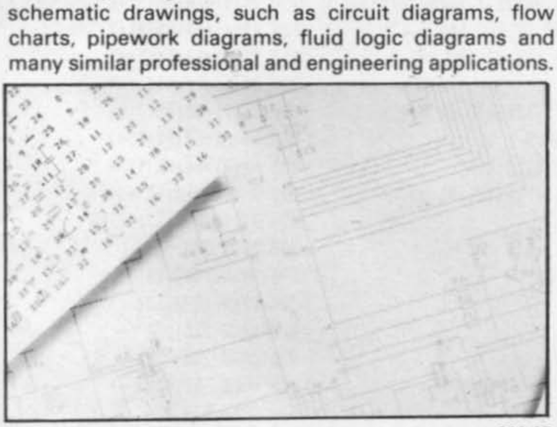

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From Page 109

```
   5 REM (C) The Micro User
  10 ON ERROR IF ERR=17 THEN M$="pre
ssed ESCAPE":PROCscroll:GOTO2490  ELS
E MODE7:REPORT:PRINT" at line ";ERL:E
ND
  20 MODE7
  30 DUMMY=RND(-TIME)
  40 VDU 23;8202;0;0;0;
  50 ENVELOPE1,10,0,0,0,1,1,1,127,-1
0,-10,-10,100,20
  60 PRINTCHR$146;CHR$55;STRING$(36,
CHR$96);CHR$107
  70 PRINTTAB(14,1);CHR$141;CHR$132;
"JACKPOT!";TAB(14,2);CHR$141;CHR$134;
"JACKPOT!"
  80 PRINTTAB(0,3);CHR$147;CHR$117;S
TRING$(36,CHR$112);CHR$122
  90 PRINT'CHR$134;"A SIMULATION FOR
 THE BBC MICROCOMPUTER"
 100 PRINT'CHR$146;CHR$55;STRING$(36
,CHR$96);CHR$107
 110 PRINTCHR$147;CHR$53;TAB(12);CHR
$133;"By Marcus Mason";TAB(37);CHR$14
7;CHR$106
 120 PRINTCHR$146;CHR$55;STRING$(36,
CHR$96);CHR$107
 130 PRINTCHR$147;CHR$53;CHR$129;"JA
CKPOT! is a game for one player.";CHR
$147;CHR$106
 140 PRINTCHR$146;CHR$53;CHR$135;"Yo
u start off with '1, which goes ";CHR
$146;CHR$106
 150 PRINTCHR$147;CHR$53;CHR$135;"do
wn by 2p for each play.When you ";CHR
$147;CHR$106
 160 PRINTCHR$146;CHR$53;CHR$135;"ha
ve less than 2p you can't go on,";CHR
$146;CHR$106
 170 PRINTCHR$147;CHR$53;CHR$135;"an
d the computer asks if you want ";CHR
$147;CHR$106
 180 PRINTCHR$146;CHR$53;CHR$135;"to
 play again.Then type 'Y' or 'N'";CHR
$146;CHR$106
 190 PRINTCHR$147;CHR$53;CHR$129;"Wh
en N or H appears under a reel, ";CHR
$147;CHR$106
 200 PRINTCHR$146;CHR$53;CHR$129;"yo
u may Nudge or Hold that reel by";CHR
$146;CHR$106
 210 PRINTCHR$147;CHR$53;CHR$129;"ty
ping the corresponding number of";CHR
$147;CHR$106
 220 PRINTCHR$146;CHR$53;CHR$129;"th
e reel.If you win more than '5, ";CHR
$146;CHR$106
 230 PRINTCHR$147;CHR$53;CHR$129;"th
en you have beaten the machine, ";CHR
$147;CHR$106
 240 PRINTCHR$146;CHR$53;CHR$129;"an
d it will end the game.GOOD LUCK";CHR
$146;CHR$106
 250 PRINTCHR$147;CHR$117;STRING$(36
,CHR$112);CHR$122
 260 PRINTCHR$146;CHR$53;CHR$136;CHR
$132;"DO YOU REQUIRE SOUND ? (Y or N)
 ";CHR$137;CHR$146;CHR$106
 270 *FX210,0
 280 IF FNANS=0 THEN *FX 210,1
 290 PRINTTAB(2,23);CHR$136;CHR$132;
"PRESS THE SPACE BAR TO CONTINUE."
 300 REPEAT UNTIL INKEY(-99)
 310 FORI%=5 TO 117 STEP8
 320 SOUND1,1,I%,1
 330 NEXT
 340 DATA 0,0,0,255,&80,&B1,&AA,&B2,
0,0,0,255,1,&9D,&55,&5D,&AB,&AA,&B2,&
80,&FF,0,0,0,&D9,&55,&55,&1,255,0,0,0
 350 DATA 2,1,31,57,14,0,0,0,31,38,1
20,128,128,128,128,128,0,14,31,31,31,
14,0,0,&B8,252,124,124,&38,0,0,0
 360 DATA 0,0,7,31,63,127,127,255,0,
0,0,192,224,240,251,255,255,127,127,6
3.31,7,0,0,254,248,240,224,192,0,0,0
 370 DATA 1,1,1,3,3,3,7,7,128,128,12
8,192,192,192,224,224,7,15,15,31.0,63
,0,1,224,240,240,248,0.252,0,128
 380 DATA 0,0,7,31,63,127,127,255,0,
0,0,192,224,240,240,248,255,127,127,6
3,31,7,0,0,248,240,240,224,192,0,0,0
 390 DATA 0,0,0,3,3,24,25,1,1,&62,&7
C,&1B,&63,&6C,&8C,&B0,12,&6C,&60,6,&3
6,48,192,192,&36,&C6,&D8,24,192,192,0
,0
 400 DATA0,0,170,170,170,170,82,0,0,
0,224,160,160,160,160.0
 410 MODE2:VDU 23;8202;0;0;0;
 420 DIM R$(11),R%(11),H%(2),N%(2)
 430 @%=&2020A
 440 RESTORE 340
 450 FOR I%=224 TO 249
 460 VDU23,I%
 470 FORJ%=0 TO 7
 480 READ U%
 490 VDU U%
 500 NEXT,
 510 B$=CHR$17+CHR$4+CHR$224+CHR$225
+CHR$8+CHR$8+CHR$10+CHR$17+CHR$6+CHR$
226+CHR$227
 520 C$=CHR$17+CHR$2+CHR$228+CHR$229
+CHR$8+CHR$8+CHR$10+CHR$17+CHR$1+CHR$
230+CHR$231
 530 P$=CHR$17+CHR$5+CHR$232+CHR$233
+CHR$8+CHR$8+CHR$10+CHR$234+CHR$235
 540 E$=CHR$17+CHR$7+CHR$236+CHR$237
+CHR$8+CHR$8+CHR$10+CHR$238+CHR$239
 550 L$=CHR$17+CHR$3+CHR$240+CHR$241
+CHR$8+CHR$8+CHR$10+CHR$242+CHR$243
 560 G$=CHR$17+CHR$5+CHR$244+CHR$245
+CHR$8+CHR$8+CHR$10+CHR$246+CHR$247
 570 S$=" "+CHR$11
 580 PRINT"WIN LINE";SPC(8);"WIN"
 590 PRINT"--------";SPC(8);"---"
 600 PRINT'B$;S$;B$;S$;B$;S$;SPC(7);
"60p"
 610 PRINT'B$;S$;B$;S$;SPC(10);"40p"
 620 PRINT'G$;S$;G$;S$;G$;S$;SPC(7);
"24p"
 630 PRINT'G$;S$;G$;S$;SPC(10);"16p"
 640 PRINT'E$;S$;E$;S$;E$;S$;SPC(7);
"18p"
 650 PRINT'E$;S$;E$;S$;SPC(10);"12p"
 660 PRINT'P$;S$;P$;S$;P$;S$;SPC(7);
"12p"
 670 PRINT'P$;S$;P$;S$;SPC(10);"8p"
 680 PRINT'L$;S$;L$;S$;L$;S$;SPC(7);
"12p"
 690 PRINT'L$;S$;L$;S$;SPC(10);"8p"
 700 PRINT'C$;S$;C$;S$;C$;S$;SPC(7);
"6p"
 710 PRINT'C$;S$;C$;S$;SPC(10);"4p"
 720 COLOUR8
 730 PRINT'''"Press SPACE BAR >>>"
 740 REPEAT UNTIL INKEY(-99)
 750 PROCscroll
 760 R$(0)=B$:R%(0)=20
 770 R$(1)=C$:R%(1)=2
 780 R$(2)=L$:R%(2)=4
 790 R$(3)=E$:R%(3)=6
 800 R$(4)=C$:R%(4)=2
 810 R$(5)=P$:R%(5)=4
 820 R$(6)=L$:R%(6)=4
 830 R$(7)=G$:R%(7)=8
 840 R$(8)=C$:R%(8)=2
 850 R$(9)=P$:R%(9)=4
 860 R$(10)=E$:R%(10)=6
 870 R$(11)=G$:R%(11)=8
 880 MOVE 200,50
 890 DRAW 1080,50
 900 DRAW 1080,600
 910 DRAW 200,600
 920 DRAW 200,50
 930 MOVE 352,500
 940 DRAW 928,500
 950 DRAW 928,200
 960 DRAW 352,200
 970 DRAW 352,500
 980 MOVE 554,500
 990 DRAW 554,200
1000 MOVE 746,500
1010 DRAW 746,200
1020 MOVE 200,600
```

```
1030 DRAW 200,800
1040 DRAW 1080,800
1050 DRAW 1080,600
1060 MOVE 200,690
1070 DRAW 1080,690
1080 VDU5
1090 GCOL0,1
1100 MOVE250,366:VDU248;249
1110 MOVE955,366:VDU248;249
1120 VDU4
1130 MOVE352,300:DRAW352,400
1140 MOVE554,300:DRAW554,400
1150 MOVE746,300:DRAW746,400
1160 MOVE928,300:DRAW928,400
1170 L=1
1180 H%=0
1190 N%=0
1200 COLOUR1
1210 PRINTTAB(4,8);"N";
1220 COLOUR7
1230 PRINT"=nudge"
1240 COLOUR2
1250 PRINTTAB(4,9);"H";
1260 COLOUR7
1270 PRINT"=hold"
1280 COLOUR3
1290 PRINTTAB(6,26);"1. 2. 3."
1300 COLOUR3
1310 PRINTTAB(4,11)"CREDIT='";
1320 PROCp(1,0)
1330 PROCp(2,0)
1340 PROCp(3,0)
1350 COLOUR1
1360 PRINTTAB(4,14)"'S' TO SPIN."
1370 COLOUR3
1380 PRINTTAB(12,11);L
1390 REPEAT UNTIL INKEY(-82)
1400 SOUND1,1,101,10
1410 SOUND2,1,117,10
1420 SOUND3,1,129,10
1430 PRINTTAB(4,14)SPC(12)
1440 L=L-0.02
1450 PRINTTAB(12,11);L
1460 PROCspin
1470 PROCcheck
1480 IF M%=1 THEN PROCwin:GOTO1520
1490 PROCfeatures
1500 IF H%=1 THEN PROChold
1510 IF N%=1 THEN PROCnudge:PROCchec
k:IF M%=1 THEN PROCwin
1520 M%=0
1530 IF L<0.02 THEN GOTO 2320
1540 IF L>=5 THEN GOTO 2400
1550 GOTO1350
1560 DEFPROCp(Q%,W%)
1570 T%=W%-1
1580 IFT%=-1 THEN T%=11
1590 U%=W%
1600 V%=W%+1
1610 IFV%=12 THEN V%=0
1620 PRINTTAB(3+(Q%*3),17);R$(T%)
1630 PRINTTAB(3+(Q%*3),20);R$(U%)
1640 PRINTTAB(3+(Q%*3),23);R$(V%)
1650 ENDPROC
1660 DEFPROCspin
1670 IF H%(0)=-1 THEN GOTO 1690
1680 A%=RND(12)-1
1690 IF H%(1)=-1 THEN GOTO 1710
1700 B%=RND(12)-1
1710 IF H%(2)=-1 THEN GOTO 1730
1720 C%=RND(12)-1
1730 FOR I%=1 TO 5
1740 FOR J%=0 TO 11
1750 IF H%(0)=-1 THEN GOTO1780
1760 IF (I%*11)+J%>A%+22 THEN PROCp(
1,A%):GOTO1780
1770 PROCp(1,J%)
1780 IF H%(1)=-1 THEN GOTO1810
1790 IF (I%*11)+J%>B%+33 THEN PROCp(
2,B%):GOTO1810
1800 PROCp(2,J%)
1810 IF H%(2)=-1 THEN GOTO1840
1820 IF (I%*11)+J%>C%+44 THEN PROCp(
3,C%):I%=5:J%=11:GOTO1840
1830 PROCp(3,J%)
1840 NEXT,
1850 FORI%=0 TO 2
1860 H%(I%)=0
1870 NEXT
1880 ENDPROC
1920 DEFFNANS
1930 A$=GET$
1940 IF A$="Y" OR A$="y" THEN Y%=1:G
OTO1980
1950 IF A$="N" OR A$="n" THEN Y%=0:G
OTO1980
1960 SOUND1,-15,ASC(A$),5
1970 GOTO1930
1980 SOUND1,1,117,1
1990 SOUND1,1,101,1
2000 =Y%
2010 DEFPROCcheck
2020 IF R$(A%)=R$(B%) AND R$(A%)=R$(
C%) THEN M%=1:N=0.03:ENDPROC
2030 IF R$(A%)=R$(B%) THEN M%=1:N=0.
02:ENDPROC
2040 M%=0
2050 ENDPROC
2060 DEFPROCwin
2070 L=L+R%(A%)*N
2080 L1=R%(A%)*N
2090 COLOUR9
2100 @%=10
2110 PRINTTAB(5,28);"* WIN:";INT((L1
+0.005)*100);"p";TAB(14,28);"*"
2120 @%=&2020A
2130 FOR I%=1 TO 20
2140 SOUND1,1,109,1
2150 SOUND1,1,101,1
2160 NEXT
2170 PRINTTAB(5,28);SPC(10)
2180 ENDPROC
2190 DEFPROCdelay(D%)
2200 T=TIME
2210 REPEAT
2220 UNTIL TIME=T+(D%*100)
2230 ENDPROC
2240 DEFPROCscroll
2250 FOR I%=1 TO 32
2260 VDU 30,11
2270 SOUND1,1,((I%/2)*8)+5,1
2280 SOUND2,1,((I%/2)*8)+21,1
2290 SOUND3,1,((I%/2)*8)+33,1
2300 NEXT
2310 ENDPROC
2320 COLOUR9
2330 PRINTTAB(12,11);L
2340 PRINTTAB(5,28);"*BAD LUCK*"
2350 SOUND1,-15,0,40
2360 PROCdelay(4)
2370 PROCscroll
2380 M$="ran out of money"
2390 GOTO 2490
2400 COLOUR9
2410 PRINTTAB(12,11);L
2420 PRINTTAB(5,28);"* EMPTY! *"
2430 FOR I%=1 TO 100
2440 SOUND 1,1,I%,0
2450 NEXT
2460 PROCdelay(4)
2470 PROCscroll
2480 M$="beat the machine"
2490 MODE7
2500 *FX 15,1
2510 VDU 23;8202;0;0;0;
2520 PRINTTAB(14,0);CHR$141;CHR$132;
"JACKPOT!"
2530 PRINTTAB(14,1);CHR$141;CHR$134;
"JACKPOT!"
2540 PRINT'CHR$131;"You ";M$;"."
2550 PRINT'CHR$130;"DO YOU WANT TO P
LAY AGAIN ? Y or N."
2560 IF FNANS THEN RUN
2570 CLS
2580 PRINTTAB(9,10);CHR$141;CHR$132;
"THANKS FOR PLAYING"
2590 PRINTTAB(9,11);CHR$141;CHR$134;
"THANKS FOR PLAYING"
2600 END
2610 DEFPROCfeatures
2620 H%=0:N%=0
2630 IF RND(2)<>1 THEN ENDPROC
2640 IF RND(2)=1 THEN GOTO 2690
```

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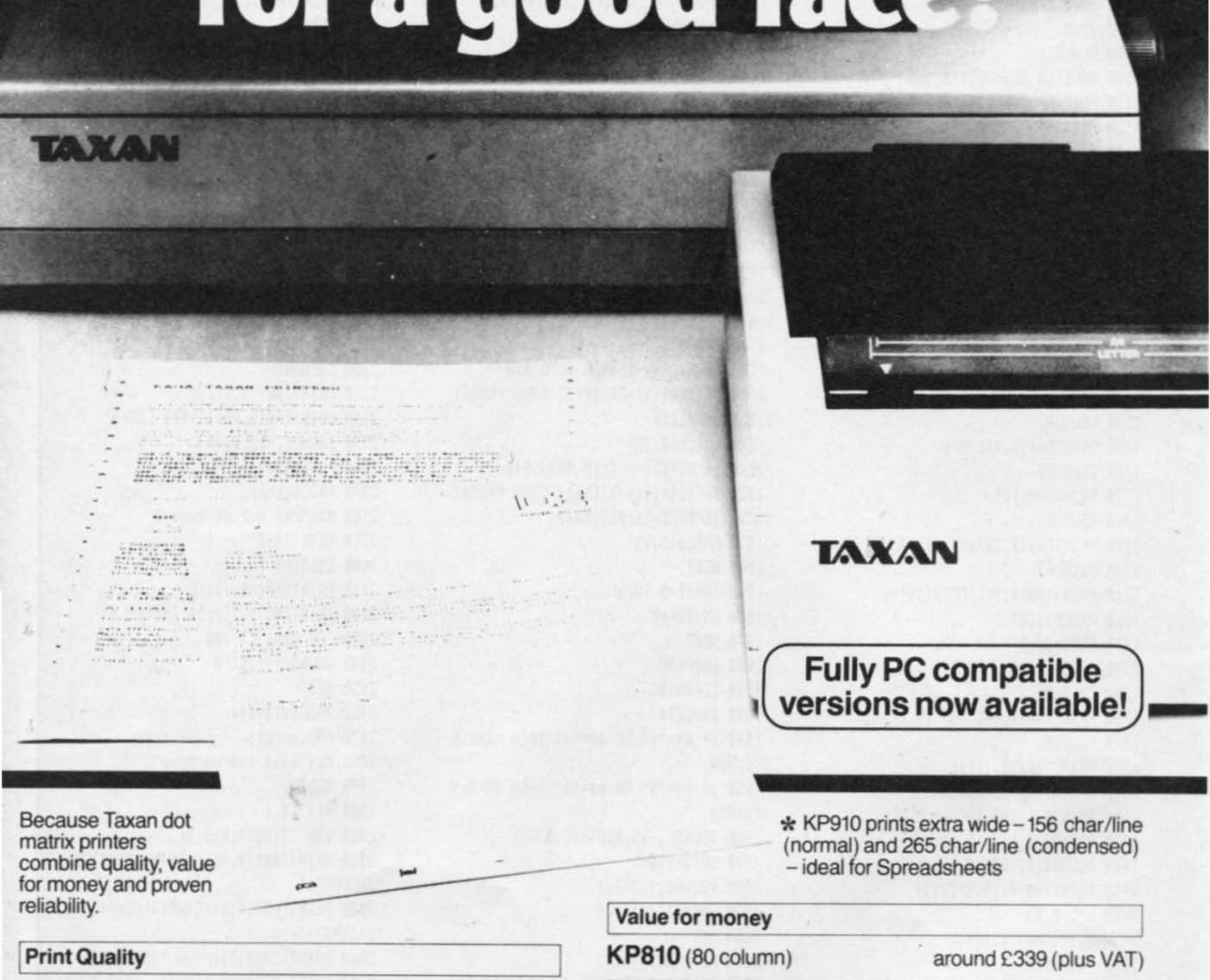

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From Page 133

```
2650 FOR I%=0 TO 2
2660 IF RND(2)=1 THEN H%(I%)=1:H%=1
2670 NEXT
2680 ENDPROC
2690 FOR I%=0 TO 2
2700 IF RND(2)=1 THEN N%(I%)=1:N%=1
2710 NEXT
2720 ENDPROC
2730 DEFPROChold
2740 COLOUR9
2750 PRINTTAB(5,28);"*HOLD NOW*"
2760 COLOUR1
2770 PRINTTAB(4,14);"'S' TO SPIN."
2780 COLOUR10
2790 FOR I%=0 TO 2
2800 IF H%(I%)=1 THEN PRINTTAB(7+(I%
*3),26);"H"
2810 NEXT
2820 *FX15,1
2830 REPEAT
2840 SOUND1,1,117,1
2850 SOUND1,1,101,1
2860 A=INKEY(0)-49
2880 IF A<0 OR A>2 THEN GOTO 2920
2890 IFH%(A)=1 THEN H%(A)=-1
2900 COLOUR2
2910 IF H%(A)=-1 THEN PRINTTAB(7+(A*
3),26);"H"
2920 UNTIL A=34
2930 PRINTTAB(5,28);SPC(10)
2940 H%=0
2950 COLOUR3
2960 PRINTTAB(6,26);"1. 2. 3."
2970 ENDPROC
2980 DEFPROCnudge
2990 COLOUR9
3000 PRINTTAB(5,28);"* NUDGE. *"
3010 COLOUR1
3020 PRINTTAB(4,14);"'S' TO SPIN."
3030 FOR I%=0 TO2
3040 IF N%(I%)=1 THEN PRINTTAB(7+(I%
*3),26);"N"
3050 NEXT
3060 TIME=0
3070 *FX15,1
3080 REPEAT
3090 SOUND1,-10,TIME/2,1
3100 A=INKEY(0)-49
3110 IF A<0 OR A>2 THEN GOTO3140
3120 IF N%(A)=1 THEN PROCturn
3130 COLOUR3
3140 UNTIL TIME>800 OR A=34
3150 COLOUR3
3160 PRINTTAB(6,26);"1. 2. 3."
3170 PRINTTAB(5,28);SPC(10)
3180 ENDPROC
3190 DEFPROCturn
3200 J=A+1
3210 ON J GOSUB 3230,3270,3310
3220 ENDPROC
3230 IF A%=11 THEN A%=-1
3240 A%=A%+1
3250 PROCp(1,A%)
3260 RETURN
3270 IF B%=11 THEN B%=-1
3280 B%=B%+1
3290 PROCp(2,B%)
3300 RETURN
3310 IF C%=11 THEN C%=-1
3320 C%=C%+1
3330 PROCp(3,C%)
3340 RETURN
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

OPUS WILL MAKE YOU A BETTER ORGANISER FOR ONLY £60

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TELEPHONE: 0737-65080

Disc Recover listing

From Page 67

```
 10 REM File recover
 20 REM By Kevin Edwards
 30 REM
 40 MODE7
 50 zp=&70:drive=0
 60 maxtracks=40
 70 restorepage=&19
 80 bufferaddr%=&FFFF1200
 90 FORpass=0TO2STEP2
 100 P%=&900
 110 [opt pass
 120 .thestart
 130 LDA#22:JSR&FFEE
 140 LDA#7:JSR&FFEE
 150 LDA#&21:STAsecsizenum
 160 LDA#(bufferaddr% AND &FFFF) DIV
256:STAbuffer+1
 170 LDX#0
 180 .restofit
 190 LDAname,X:BEQnomore
 200 STA&7FCA,X
 210 INX:BNErestofit
 220 .nomore LDA#0
 230 STAcurrenttrk:STAcurrentsec
 240 JSRseek
 250 LDY#0
 260 .header
 270 LDAheadmess,Y:BEQgrabit
 280 JSR&FFEE:INY:BNEheader
 290 .grabit
 300 JSRdisptop2
 310 JSRreadsector
 320 JSRdisplaysector
 330 .checkleft
 340 LDX#&E6:JSRkeycheck
 350 BNEcheckright
 360 LDAcurrenttrk:ORAcurrentsec
 370 BEQcheckright
 380 DECcurrentsec
 390 LDAcurrentsec:BPLgrabit
 400 LDA#9:STAcurrentsec
 410 DECcurrenttrk:BPLgrabit
 420 .checkright
 430 LDX#&86:JSRkeycheck
 440 BNEcheckup
 450 LDAcurrenttrk:CMP#maxtracks-1
 460 BNEnotendtrk
 470 LDAcurrentsec
 480 CMP#9:BEQcheckup
 490 .notendtrk
 500 INCcurrentsec:LDAcurrentsec
 510 CMP#10:BNEgrabit
 520 LDA#0:STAcurrentsec
 530 INCcurrenttrk:BPLgrabit
 540 .checkup
 550 LDX#&C6:JSRkeycheck
 560 BNEcheckdown
 570 LDAcurrenttrk:CMP#maxtracks-1
 580 BNEnotmaxtrk
 590 LDA#0:STAcurrenttrk:JMPgrabit
 600 .notmaxtrk
 610 INCcurrenttrk:JMPgrabit
 620 .checkdown
 630 LDX#&D6:JSRkeycheck
 640 BNEfind
 650 LDAcurrenttrk:BNEnotlsttrack
 660 LDA#maxtracks-1:STAcurrenttrk
 670 JMPgrabit
 680 .notlsttrack
 690 DECcurrenttrk:JMPgrabit
 700 .find
 710 LDX#&DF:JSRkeycheck
 720 BNErecover
 730 .nxtsector
 740 LDAcurrenttrk
 750 CMP#maxtracks-1:BNEnotlsttrk
 760 LDAcurrentsec
 770 CMP#9:BNEnotlsttrk
 780 JMPgrabit
 790 .notlsttrk
 800 INCcurrentsec:LDAcurrentsec
 810 CMP#10:BNErecoversec
 820 LDA#0:STAcurrentsec
 830 INCcurrenttrk
 840 .recoversec
 850 JSRdisptop2
 860 JSRreadsector
 870 JSRdisplaysector
 880 LDX#&AE:JSRkeycheck
 890 BEQterm
 900 LDA bufferaddr% AND &FFFF
 910 CMP#&D:BNEnxtsector
 920 .term
 930 JMPgrabit
 940 .recover
 950 LDX#&9F:JSRkeycheck
 960 BEQreadfile
 970 .finish
 980 LDX#&DD:JSRkeycheck
 990 BEQleaveprogram
1000 JMPcheckleft
1010 .leaveprogram
1020 LDA#15:LDX#0:JSR&FFF4
1030 LDA#12:JMP&FFEE
1040 .readfile
1050 LDA#&7C-restorepage:STAzp
1060 LDA#0:STAbuffer
1070 LDA#restorepage:STAbuffer+1
1080 LDA#10:SEC:SBCcurrentsec
1090 STAzp+1:LDAzp:SBCzp+1:STAzp
1100 LDAzp+1:JMPread1
1110 .next
1120 LDAzp:BNEnext2
1130 .complete
1140 LDA#15:LDX#0:JSR&FFF4
1150 LDA#12:JSR&FFEE
1160 LDA#7:JMP&FFEE
1170 .next2
1180 CMP#10:BCCnext3
1190 SBC#10:STAzp
1200 LDA#10:BNEread1
1210 .next3
1220 LDX#0:STXzp
1230 .read1
1240 CLC:ADC#&20:STAsecsizenum
1250 LDAcurrenttrk:LDXcurrentsec
1260 JSRgetsector
1270 LDAsecsizenum:AND#&F
1280 CLC:ADCbuffer+1:STAbuffer+1
1290 LDA#0:STAcurrentsec
1300 INCcurrenttrk:LDAcurrenttrk
1310 CMP#maxtracks:BNEnext
1320 BEQcomplete
1330 .displaysector
1340 LDA#(bufferaddr% AND &FFFF) MOD
256:STAzp
1350 LDA#(bufferaddr% AND &FFFF) DIV
256:STAzp+1
1360 LDA#&50:STAzp+2
1370 LDA#&7C:STAzp+3
1380 LDA#22:STAzp+7
1390 .display
1400 LDY#0:STYzp+6
1410 .nextset
1420 LDAzp+1:JSRout
1430 LDAzp:JSRout:INY
1440 LDX#1:STXzp+6:DEX
1450 TXA:STAzp+4
1460 .bytey
1470 LDA(zp,X):JSRout
1480 INY:INCzp:BNEnh1
1490 INCzp+1
1500 .nh1
1510 INCzp+4:LDAzp+4
1520 CMP#8:BCCbytey
1530 LDAzp+2:CLC:ADC#40:STAzp+2
1540 BCCexit:INCzp+3
1550 .exit
1560 DECzp+7:BNEdisplay
1570 RTS
1580 .out
1590 PHA:LSRA:LSRA:LSRA:LSRA
1600 JSRdigout
1610 PLA:PHA:AND#15:JSRdigout
1620 LDAzp+6:BNEcont:PLA:RTS
1630 .cont
1640 STYzp+5
1650 LDAzp+4:CLC:ADC#31:TAY:PLA
1660 CMP#126:BCSugh
1670 CMP#32:BCSready
1680 .ugh
1690 LDA#46
1700 .ready
1710 STA(zp+2),Y:LDYzp+5:RTS
1720 .digout
1730 CMP#10:BCCnope
1740 ADC#6
1750 .nope
1760 ADC#48:STA(zp+2),Y
1770 INY:RTS
1780 .readsector
1790 LDAcurrenttrk:PHA:JSRseek
1800 PLA:LDXcurrentsec:JSRgetsector
1810 JMPdisplaysector
1820 .seek
1830 STAseektrack
1840 LDX#seekblock MOD 256
1850 LDY#seekblock DIV 256
1860 JSRosword7F
1870 LDAseekresult:BNEseekfail
1880 RTS
1890 .seekfail
1900 opt FNequb(0)
1910 opt FNequb(0)
1920 opt FNequb(7)
1930 opt FNequs("Bad seek")
1940 opt FNequb(0)
1950 .getsector
1960 STAtrack
1970 STXsector
1980 LDX#readblock MOD 256
1990 LDY#readblock DIV 256
2000 JSRosword7F
2010 LDAreadresult:BNEreadfail
2020 RTS
2030 .readfail
2040 TAX:LDY#0
2050 .printmessage
2060 LDAerrmessage,Y:BMIendofstr
2070 JSR&FFEE
2080 INY:BNEprintmessage
2090 .endofstr
2100 TXA:JMPhexout
2110 .errmessage
2120 opt FNequb(31)
2130 opt FNequb(4)
2140 opt FNequb(1)
2150 opt FNequs("Read error - Error
type = &")
2160 opt FNequb(&80)
2170 .osword7F
2180 LDA#&7F:JMP&FFF1
2190 .hexout
2200 PHA:LSRA:LSRA:LSRA:LSRA
2210 JSRpdigit:PLA:AND#15
2220 .pdigit
2230 CMP#10:BCCalpha
2240 ADC#6
2250 .alpha
2260 ADC#48
2270 JMP&FFEE
2280 .keycheck
2290 LDA#&81:LDY#&FF:JSR&FFF4
2300 CPY#&FF:RTS
2310 .disptop2
2320 LDY#2
2330 .vdu31trk
2340 LDAvdutrk,Y
2350 JSR&FFEE:DEY:BPLvdu31trk
2360 LDAcurrenttrk:JSRhexout
2370 LDY#2
2380 .vdu31sec
2390 LDAvdusec,Y
2400 JSR&FFEE:DEY:BPLvdu31sec
2410 LDAcurrentsec:JSRhexout
2420 LDY#39:LDA#32
2430 .clear2ndline
2440 STA&7C28,Y:DEY:BPLclear2ndline
2450 RTS
2460 .headmess
2470 opt FNequb(30)
2480 opt FNequb(129)
2490 opt FNequs("File Recover")
2500 opt FNequb(134)
2510 opt FNequs("Track = &  ")
2520 opt FNequb(131)
2530 opt FNequs("Sector = &  ")
2540 opt FNequb(0)
2550 .vdutrk
2560 opt FNequb(0)
2570 opt FNequb(23)
2580 opt FNequb(31)
2590 .vdusec
2600 opt FNequb(0)
2610 opt FNequb(36)
2620 opt FNequb(31)
2630 .name
2640 opt FNequb(133)
2650 opt FNequs("By Kevin Edwards")
2660 opt FNequb(0)
2670 .seekblock
2680 opt FNequb(drive)
2690 opt FNequd(&FFFFFFFF)
2700 opt FNequb(1)
2710 opt FNequb(&69)
2720 .seektrack
2730 opt FNequb(0)
2740 .seekresult
2750 opt FNequb(0)
2760 .readblock
2770 opt FNequb(drive)
2780 .buffer
2790 opt FNequd(bufferaddr%)
2800 opt FNequb(3)
2810 opt FNequb(&53)
2820 .track
2830 opt FNequb(0)
2840 .sector
2850 opt FNequb(0)
2860 .secsizenum
2870 opt FNequb(&21)
2880 .readresult
2890 opt FNequb(0)
2900 .currenttrk
2910 opt FNequb(0)
2920 .currentsec
2930 opt FNequb(0)
2940 ]NEXT
2950 END
2960 DEFFNequb(byte)
2970 ?P%=byte
2980 P%=P%+1
2990 =pass
3000 DEFFNequs(string$)
3010 $P%=string$
3020 P%=P%+LEN(string$)
3030 =pass
3040 DEFFNequd(dword)
3050 !P%=dword
3060 P%=P%+4
3070 =pass
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

From Page 61

```
 4030 IFINKEY(-66)y%=y%+8
 4040 IFINKEY(-98)y%=y%-8
 4050 IFNOTD%ANDINKEY(-99)PROCdecide
 4060 ENDPROC
 5000 DEFPROCwhere
 5010 x%(V%)=RND(800)+120
 5020 y%(V%)=RND(300)+700
 5030 s%(V%)=244:c%(V%)=32:p%(V%)=FAL
SE:h%(V%)=(RND(3)-2)*RND(4):w%(V%)=32
 5040 GCOL3,13+V%
 5050 MOVEx%(V%),y%(V%):VDUs%(V%),s%(
V%)+1
 5060 ENDPROC
 6000 DEFPROCplane
 6010 GCOL3,13+V%
 6020 MOVEx%(V%),y%(V%):VDUs%(V%),s%(
V%)+1
 6030 c%(V%)=c%(V%)+TRUE:IFc%(V%)<FAL
SE c%(V%)=FALSE
 6040 IFc%(V%)MOD4=FALSE ANDs%(V%)>23
0s%(V%)=s%(V%)-2
 6050 IFc%(V%)>8y%(V%)=y%(V%)-8ELSEy%
(V%)=y%(V%)+24:IFy%(V%)>1024 p%(V%)=T
RUE:ENDPROC
 6060 x%(V%)=x%(V%)+h%(V%):h%(V%)=h%(
V%)+h%(V%)/4
 6070 MOVEx%(V%),y%(V%):VDUs%(V%),s%(
V%)+1
 6080 w%(V%)=c%(V%)
 6090 ENDPROC
 7000 DEFPROCdecide
 7010 D%=TRUE:X%=640:Y%=FALSE:B%=224
 7020 C%=15
 7030 XS%=(x%-X%)DIVC%
 7040 YS%=y%DIVC%
 7050 GCOL3,7:MOVEX%,Y%:VDUB%
 7060 GCOL3,3
 7070 SOUND&10,1,6,10
 7080 ENDPROC
 8000 DEFPROCfire
 8010 GCOL3,7:MOVEX%,Y%:VDUB%
 8020 C%=C%+TRUE:X%=X%+XS%:Y%=Y%+YS%
 8030 IFC%=FALSE PROCpeek:D%=FALSE:EN
DPROC
 8040 IFC%MOD3=FALSE B%=B%+1
 8050 MOVEX%,Y%:VDUB%
 8060 ENDPROC
 9000 DEFPROCbang(V%)
 9010 GCOL3,3:MOVEx%,y%:VDU229
 9020 LOCALa%,b%,c%
 9030 a%=x%(V%):b%=y%(V%):c%=c%(V%)
 9040 GCOL3,13+V%:MOVEa%,b%:VDUs%(V%)
,s%(V%)+1
 9050 p%(V%)=TRUE:SC%=SC%+c%
 9060 SOUND&10,-15+c%DIV3,5,20
 9070 FORT%=-10 TO20
 9080 IFT%<11GCOL3,4:MOVEa%,b%:PLOT65
,bx%(T%+10)*(32-c%)DIV8,by%(T%+10)*(3
2-c%)DIV8
 9090 PROCmove(V%)
 9100 IFT%>TRUE GCOL3,4:MOVEa%,b%:PLO
T65,bx%(T%)*(32-c%)DIV8,by%(T%)*(32-c
%)DIV8
 9110 V%=V%+1:IFV%>L%V%=FALSE
 9120 NEXT
 9130 PROCscore
 9140 ENDPROC
10000 DEFPROCpeek
10010 IFc%(V%)=8ENDPROC
10020 LOCALV%
10030 GCOL3,3:MOVEx%,y%:VDU229
10040 T%=-M%-4:REPEAT:T%=T%+4
10050 V%=POINT(X%+32,Y%-16+T%)
10060 IFV%=8ORV%=9ORV%=11PROCbang((V%
EOR6)-13):UNTILTRUE:ENDPROC
10070 UNTILT%>M%
10080 GCOL3,3:MOVEx%,y%:VDU229
10090 ENDPROC
11000 DEFPROCinit
11010 *FX16,2
11020 VDU23,224,24,60,60,60,60,60,60,
24
11030 VDU23,225;24,60,60,60,60,24;
11040 VDU23,226,0;24,60,60,24,0;
11050 VDU23,227;0;24,24;0;
11060 VDU23,228;0;0,16;0;
11070 VDU23,229;198,130;0;130,198
11080 VDU23,230,255,17,57,17,127,9,2,
2
11090 VDU23,231,255,136,156,136,254,1
44,64,64
11100 VDU23,232;127,9,9,63,1,2;
11110 VDU23,233;254,144,144,252,128,6
4;
11120 VDU23,234,0;63,9,31,1,2;
11130 VDU23,235,0;252,144,248,128,64;
11140 VDU23,236,0;31,5,15,1,0;
11150 VDU23,237,0;248,160,240,128,0;
11160 VDU23,238,0;15,7,1;0;
11170 VDU23,239,0;240,224,128;0;
11180 VDU23,240,0;7,3,0;0;
11190 VDU23,241,0;224,192,0;0;
11200 VDU23,242,0;3,1,0;0;
11210 VDU23,243,0;192,128,0;0;
11220 VDU23,244,0;1;0;0;
11230 VDU23,245,0;128;0;0;
11240 VDU23,246,32,32,116,126,218,254
,238,238
11250 VDU23,247,0;34,34,250,127,127;
11260 VDU23,248,0;64,64,79,254,254;
11270 VDU23,249,1,1,57,25,255,127,0;
11280 VDU23,250;0;28,255,254,0;
11290 VDU23,251,255,255,255,255,255,2
55,255,255
11300 VDU23,252,0;0;4,12,14;
11310 ENVELOPE1,8,0,0,0,1,5,5,127,-10
,-10,-10,126,0
11320 ENVELOPE2,1,0,0,0,1,1,1,126,0,0
,0,126,126
11330 ENVELOPE3,136,-3,-3,-3,4,4,4,14
,12,0,-8,126,0
11340 x%=640:y%=500:mx%=x%:my%=y%:HS%
=500
11350 DIMbx%(20),by%(20),x%(2),y%(2),
c%(2),s%(2),h%(2),p%(2),w%(2),SX%(3),
SY%(3),SHIP$(3)
11360 SHIP$(0)=CHR$247+CHR$248:SHIP$(
1)=SHIP$(0)
11370 SHIP$(2)=CHR$249+CHR$250:SHIP$(
3)=SHIP$(2)
11380 RESTORE:FORT%=0TO3:READSX%(T%),
SY%(T%):NEXT
11390 DATA200,200,600,240,300,120,330
,290
11400 FORT%=0TO20
11410 by%(T%)=RND(100)-51:bx%(T%)=RND
(150)-50
11420 NEXT
11430 ENDPROC
12000 DEFPROCvari
12010 p%(0)=TRUE:p%(1)=TRUE:p%(2)=TRU
E
12020 D%=FALSE:Z%=1220:I%=229:SC%=FAL
SE:sc%=150:L%=FALSE:1%=1:F%=3:G%=FALS
E
12030 FORT%=0TO15:VDU19,T%,-(T%=10)*3
;0;:NEXT
12040 COLOUR132:CLS
12050 VDU28,0,19,19,0
12060 COLOUR134:CLS
12070 COLOUR10:PRINT'"IF YOU'LL JUST
WAIT"''"FOR HALF A MO."''"THEN OFF TO
 CORNWALL"'"WE SHALL GO."
12080 FORT%=0TO5:SOUND3,1,130,22:NEXT
12090 PROCscene
12100 VDU4,28,0,11,19,0,12,28,0,31,19
,31,17,143,5
12110 RESTORE12130
12120 FORT%=1TO15:READA%:VDU19,T%,A%;
0;:NEXT
12130 DATA0,12,0,4,0,6,0,0,0,0,0,7,1,
2,3
12140 COLOUR10:PROCscore
12150 GCOL3,3:MOVEx%,y%:VDUI%
12160 *FX9,2
12170 *FX10,2
12180 ENDPROC
13000 DEFPROCscore
13010 VDU4
13020 IFSC%=FALSE CLS:PRINT"SCORE:";T
AB(12)"HI:";HS%;
13030 PRINTTAB(6,0);SC%;
```

```
13040 VDU5
13050 ENDPROC
14000 DEFPROCscene
14010 VDU5
14020 FORT%=0TO100STEP4:GCOL0,15+(T%M
OD8=FALSE)
14030 MOVE30+T%,490-T%DIV2:MOVE130+T%
DIV6,350-T%DIV2:PLOT85,350-T%*2,500-T
%
14040 GCOL0,15+(T%MOD8=FALSE)
14050 MOVE1250-T%,450-T%DIV2:MOVE1150
-T%DIV6,310-T%DIV2:PLOT85,930+T%*2,46
0-T%
14060 GCOL0,13+-(T%MOD8=FALSE)
14070 MOVE1140-T%DIV2,300-T%DIV3:MOVE
820-T%DIV8,350-T%DIV12:PLOT85,940-T%*
2,460-T%
14080 GCOL0,13+-(T%MOD8=FALSE)
14090 MOVE230+T%,350-T%MOD2:MOVE430+T
%DIV8,350-T%DIV12:PLOT85,330-T%*2,500
-T%
14100 NEXT
14110 GCOL0,1:MOVE1070,466:VDU246
14120 MOVE950,360:MOVE962,420:PLOT85,
974,360
14130 MOVE130+T%,380-T%MOD3:MOVE330+T
%DIV4,350-T%DIV12:PLOT85,330-T%*3,500
-T%
14140 FORT%=0TO2:SOUND3,1,130,22:NEXT
14150 FORT%=0TO300STEP4:GCOL0,14+-(T%
MOD8=FALSE)
14160 MOVE1279,300-T%DIV2:MOVE1279,53
0-T%:PLOT85,800+T%,300
14170 MOVE0,300-T%DIV2:MOVE0,500-T%:P
LOT85,480-T%,300
14180 NEXT
14190 GCOL0,5:MOVE130,480:VDU246
14200 MOVE928,350:MOVE940,410:PLOT85,
952,350
14210 FORT%=0TO3:GCOL0,1:MOVESX%(T%),
SY%(T%):PRINTSHIP$(T%)
14220 NEXT
14230 GCOL0,10:MOVE0,56:DRAW1279,56:V
DU24,0;0;1279;48;:GCOL0,143:CLG
14240 VDU26
14250 ENDPROC
15000 DEFPROCask
15010 PROC7scn
15020 PRINTTAB(9,10)"INSTRUCTIONS  Y/
N"
15030 REPEAT:T%=GETAND223:UNTILT%=89O
RT%=78:SOUND3,1,130,22
15040 CLS:IFT%=89PROCinst
15050 PROCfindJ
15060 ENDPROC
16000 DEFPROCinst
16010 PRINT'"It is the closing days o
f the first world war.  You are the c
ommander ofa small harbour in Cornwal
l when youare attacked by a squadron
of Fokkerbi-planes. Your only armamen
t is an ancient Boer war cannon."
16020 PRINT"With luck you will surviv
e long"'"enough to gain a fine memori
al on"'"your grave!"
16030 PRINT'"Use joystick or the foll
owing keys."''TAB(10)"A ..........UP"
TAB(10)"Z ..........DOWN"TAB(10)"< ..
........LEFT"TAB(10)"> ..........RIGH
T"TAB(10)"SPACE ......FIRE"
16040 PRINT''TAB(8)CHR$136"PLEASE PRE
SS SPACE"
16050 REPEATUNTILGET=32:SOUND3,1,130,
22
16060 ENDPROC
17000 DEFPROC7scn
17010 FORT%=0TO24:PRINTTAB(0,T%)CHR$1
57CHR$132;:NEXT
17020 FORT%=0TO1:PRINTTAB(8,T%)CHR$13
3CHR$157CHR$141;CHR$134"HARBOUR COMMA
ND  "CHR$135CHR$157:NEXT
17030 VDU28,2,24,37,2
17040 VDU23;8202;0;0;0;12
17050 ENDPROC
18000 DEFPROCend
18010 IFSC%>HS%HS%=SC%
18020 Q%=SC%DIV200:IFQ%>5Q%=5
18030 RESTORE18050
18040 FORT%=0TOQ%:READ$&3000:NEXT
18050 DATA FAILED MISERABLY IN HIS TA
SK,GIVEN A POOR ACCOUNT OF HIMSELF,PE
RFORMED SATIFACTORILLY,PUT UP A GOOD
SHOW,GIVEN HIS LIFE WITH HONOUR,AWARD
ED THE V.C. POSTHUMOUSLY
18060 PROC7scn:SOUND&10,0,0,0
18070 FORT%=0TO1:PRINTTAB(13)CHR$141"
EPITAPH":NEXT:PRINT''"Today it has be
en reported that a"'"harbour in Cornw
all has been wiped"'"out by the Bosh.
 The comander is"'"said to have : "'
$&3000
18080 PRINT''"You attained a score of
 ";SC%
18090 PRINT''''TAB(10)CHR$136"PLAY AG
AIN Y/N"
18100 REPEAT:T%=GET AND223:UNTILT%=89
ORT%=78
18110 IFT%=78CLS:FORT%=10TO11:PRINTTA
B(14,T%)CHR$141;CHR$136"BYE!":NEXT:EN
D
18120 PROCfindJ
18130 ENDPROC
19000 DEFPROCmusic
19010 *FX15
19020 RESTORE19100
19030 REPEAT:READt%,d%:IFt%=-1:UNTILT
RUE:ENDPROC
19040 SOUND1,-15,t%,d%*2
19050 TIME=FALSE:REPEATUNTILTIME>5
19060 SOUND2,-15,t%,d%*2
19070 TIME=FALSE:REPEATUNTILTIME>5
19080 SOUND3,-15,t%,d%*2
19090 UNTILFALSE
19100 DATA32,2,48,2,60,3,68,1,60,2,48
,2,32,2,48,2,60,2,68,2,60,2,48,2,32,2
,48,2
19110 DATA60,6,68,6,52,3,48,1,52,2,40
,4,48,2,52,3,48,1,52,2,40,2,24,2,40,2
,52,2,48,2,40,2,68,4
19120 DATA76,2,60,1,60,3,60,2,60,4,52
,2,48,3,40,1,48,2,32,3,32,2,48,2,48,6
,40,2,48,4,32,12
19130 DATA-1,-1
20000 DEFPROCtitle
20010 VDU23;8202;0;0;0;
20020 FORT%=0TO7
20030 COLOURT%MOD6+1:PRINTTAB(0,T%*4)
;
20040 FORI%=0TO4:VDU9,230,231,9:NEXT
20050 COLOUR(T%+2)MOD6+1
20060 PRINTTAB(2,T%*4+2)"HARBOUR  COM
MAND"
20070 NEXT
20080 PROCmusic
20090 ENDPROC
21000 DEFPROCfindJ
21010 *FX21
21020 CLS:PRINTTAB(6,9)"WHAT LEVEL OF
 DIFFICULTY"''TAB(8)"1 - EASY TO 4 -
HARD"
21030 REPEAT:T%=GETAND239:UNTILT%>32A
NDT%<37:SOUND3,1,130,22
21040 M%=(36-T%)*4:m%=1+(16-M%)DIV3
21050 *FX21
21060 CLS:PRINTTAB(5,9)"PRESS RETURN
FOR KEYBOARD"''TAB(4)"OR FIRE BUTTON
FOR JOYSTICK"
21070 REPEATJ%=INKEY(0):UNTILJ%=13ORA
DVAL(0)AND1
21080 IFNOTJ%J%=FALSE
21090 ENDPROC
22000 DEFPROCrelocate
22010 *TAPE
22020 FORT%=0TOTOP-PAGE STEP4:T%!&E00
=T%!PAGE:NEXT
22030 *KEY9OLD|MRUN|M
22040 *FX138,0,137
22050 PAGE=&E00
22060 END
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

NEW SOFTWARE RELEASES FROM CHASE DATA

CHASE DATA SOFTWARE NOW COMPATIBLE WITH UDM & OPUS DFS PLEASE STATE WHEN ORDERING

Vector 1–
The ultimate tape to disk utility
Vector 1 allows you to transfer almost all your tape software to disk. Unlike others, you only need to buy 1 copy of Vector 1 since it transfers tapes to specially formatted program discs. This is easily the most powerful tape to disk utility available.

Vector 2–
Disk to disk utility
Vector 2 allows you to make backup copies of all your valuable disk software. It is the most advanced utility of its kind available. It is a condition of sale that neither of these products are used for infringement of copyright.

Vector 1 **£16** On its own
£15 If purchased with disk drive
Vector 2 **£16** On its own
£15 If purchased with disk drive
Vector 1 & 2 **£30**

Canon 211A 1/3 height "Super-Slim" (33.5) 40 track double sided 200K floppy disc drive, direct drive.
Price Includes:
Drive cased with cables, manual & utilities disc and includes VAT, postage & packing.

SPECIAL OFFER

200K 40TK DS
WHILE STOCKS LAST

£89 INC.

Specifications:
40 track double sided disc drive capacity 200K in single density
Operates in double density
Track to track access time – 6 ms
Full 12 month warranty with optional extended warranty available

SPECIAL OFFER

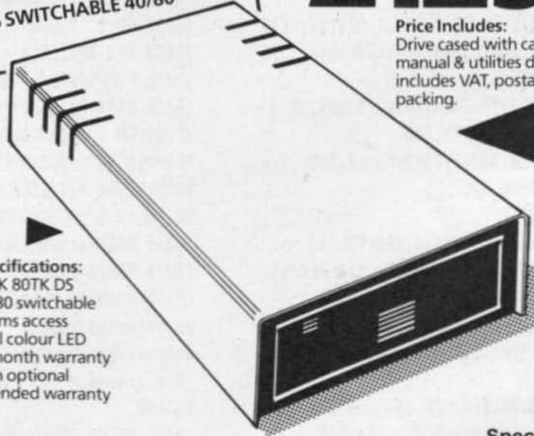
400K 80TK DS SWITCHABLE 40/80
WHILE STOCKS LAST

£129 INC.

Price Includes:
Drive cased with cables, manual & utilities disc and includes VAT, postage & packing.

£154 INC.

SPECIFICALLY ENHANCED FOR USE WITH THE BBC MICRO.



Specifications:
400K 80TK DS
40/80 switchable
3/6 ms access
Dual colour LED
12 month warranty with optional extended warranty

Canon 221A "Super-Slim" (33.5mm) 80 track double sided 400K floppy disc drive (40/80 track switching).

Continuing our policy of securing premium quality products at budget prices we are pleased to announce the new generation Canon 221A drive.
Specifications:
80 track double sided disc drive. 40/80 track switching with dual colour LED. Capacity 400K in single density, operates in double density. Direct drive, track to track access 3 ms in 96 TPI mode. Dimensions:– 1/3 standard height, only 33.5mm.

All canon 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination. To give a clear operating status, as follows.

40 TRACK MODE: ________ LED GREEN
80 TRACK MODE: ________ LED RED
POWER ON: ________ HALF-ILLUMINATION *(GREEN OR RED)*
DRIVE SELECTED: ________ FULL-ILLUMINATION *(GREEN OR RED)*

EPROMS
QUALITY EPROMS BY 'HITACHI'

Special price whilst stocks last

2764-250 NS £3.00 ea
27128-250 NS 5.50 ea
INCLUSIVE OF P & P & VAT

DISCUS
Test utility for testing your own disc drive, at regular intervals to avoid the dreaded flop of your floppy. Menu driven, easy to use, 40 or 80 track versions.

Tests: Motor speed, read/write, steptest, alignment test,* step & read/write test, read only test.

£8.00 inc. **£7.00** if purchased with disc drive.
*This test requires an oscilloscope & alignment disc.

BASIC COMPILER

A really professional Basic compiler for the BBC micro enabling you to write programs in basic which may then be compiled into extremely fast 'optimised' machine code. The program allows the use of a large number of Basic keywords, and long programs – up to 11k of compiled code – may be compiled directly. Larger programs may be produced by using built in overlay techniques.

FEATURES

- Keywords – *Fx,ABS,ADVAL,AND,ASC,CALL,CHR$,CLG,CLS,COLOUR, DEF,DIM,DIV,DRAW,ELSE,END,ENDPROC,ENVELOPE,EOR,FALSE,FN,FOR, GCOL,GET,GOSUB,GOTO,IF,INKEY,INPUT,LEN,LET,LOCAL,MOD,MODE, MOVE,NEXT,NOT,ON,OR,PLOT,POINT,POS,PRINT,PROC,REM,REPEAT, RETURN,RND,RUN,SGN,SPC,SOUND,STEP,STOP,STR$,TAB,THEN,TIME,TO, TRUE,UNTIL,USR,VAL,VDU,VPOS and any O.S. command. (statements starting with *)
- String handling using $ indirection operator.
- Handles 16 bit signed integer numbers.
- Nesting of loops and procedures, and parameter passing for functions and procedures.
- Assembly language statements may be incorporated into the basic source code.
- Library routines may be stored on disc and incorporated into any compiled program.
- Comprehensive instruction manual.

£28.75 **Including P & P & VAT** Supplied only on disc – 40T/80T compatible.

DIAGRAM

A program which allows you to store very large diagrams – up to 39 mode 0 screens – and view or edit them by SCROLLING the computer screen around over any part of the diagram.

FEATURES

- Draw diagrams, schematics, plans etc., in any aspect ratio, e.g. 10*3, 2*12 screens.
- Access any part of the diagram rapidly by entering an index name, e.g. TR6, R5 etc., to display a specific section of the diagram, and then scroll around to any other part of the diagram using the cursor keys.
- Up to 128 Icons may be predefined for each diagram, e.g. Transistors, resistors etc., in full mode 0 definition, up to 32 pixels horizontally by 24 vertically.
- Hard copy printouts in varying print sizes up to 9 mode 0 screens on an A4 size sheet, compatible with most dot matrix printers.
- Many other features including, selectable display colours, comprehensive line drawing facilities, TAB settings, etc.
- Disc contains sample diagrams and two versions of the program, one of which will work from a 16k sideways RAM.
- Comprehensive instruction manual.

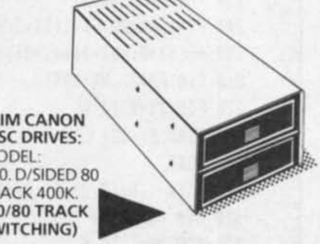
£28.75 **Including P & P & VAT** Supplied only on disc – 40T/80T compatible.

THE SCYTHE TOOLKIT

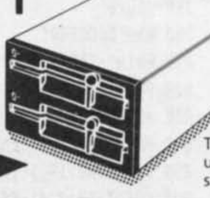
If you can't see the wood for the trees, get THE SCYTHE and HACK your way through!! This ROM contains loads of useful commands and has the added bonus of accepting both HEX & DECIMAL entry.

MDIS: A fast UP/DOWN scrolling disassembler which will examine all paged ROM's. Will work in any 40 or 80 column mode.
SDIS: Will spool disassembled code in a form compatible with the BASIC2 assembler, data is represented with EQUBs.
MERIT: Memory editor with hex/asci display, UP/DOWN scrolling with paged ROM/RAM access. Will work in any 40 or 80 column mode.
KLIST: Expands soft key definitions and presents them so they can be easily edited, all codes are expanded so that wordwise type definitions can be changed.
BASE: Will accept a number and display its HEX,DECIMAL & BINARY equivalents.
ROMLIST: Displays what ROMS are present in your machine and the ROM size.
ROMSAVE: Will save any sideways ROM to the current filing system.
FORMAT: Formats a disk to any number of tracks.
VERIFY: Verifies a disk shows up bad tracks, and displays an error count.
FREE: Displays an analysis of the free space available on a disk.
SFIND: Search memory for the occurence of a specified string.
BFIND: Search memory for the occurence of any sequence of bytes.
XLIST: Will search a BASIC program for any VDU codes (which may for instance be used to make the program unlistable) and replace them.
BAD: Will attempt to repair a bad program.
MRELOC: Will add a relocating program to a machine code file so that it will automatically download and run.
SLOW: Will slow down operation of the BBC (over a variable range) to allow easier playing on many games, and the analysis of the operation of graphics etc.
TDISK: Comprehensive file transfer utility allowing you to transfer files between filing systems (ROM, NET, DISK, TAPE). Many features including locking/unlocking programs, can handle any length of file, most forms of tape protection coped with.
VECTOR: Will produce a menu of the programs on a VECTOR1 program disk, and run them, this utility will cope with some forms of protection which cannot be handled by any disk based product.

£24 **Including P & P & VAT**



SLIM CANON DISC DRIVES:
MODEL:
220. D/SIDED 80
TRACK 400K.
(40/80 TRACK SWITCHING)



SLIM SANYO DISC DRIVES:
MODEL: 596D. SPECIFICATION OF EACH DRIVE: D/SIDED 40/80 TRACK 400K.
(40/80 TRACK SWITCHING)

The Sanyo disc drive is a "half-height" 40/80 track switchable unit of standard dimensions, built to Sanyo's usual high standards of quality and reliability.

All inclusive price list: This means: disc drive + case + all power & data cables + UK carriage + utilities disc & manual + VAT.

Model	CANON 211A	220	221A	596D SANYO
Formatted Capacity per drive on BBC Micro:	200K	400K	400K	400K
Single Drive & Case:	£89	£129	£154	£149
Single Drive & Case/PSU:	–	£154	£179	£174
Dual Drive & Case:	–	£229	£289	£279
Dual Drive & Case/PSU:	£219	£259	£319	£309

FUJI FLOPPY DISCS

	Per box 10	If purchased with disc drive
40 TK SS DD	£17.60	£15.60
40 TK DS DD	£24.50	£22.50
80 TK DS DD	£28.60	£26.60

These prices include VAT & P & P.

DON'T FORGET YOUR VECTOR 1 & 2 WHEN ORDERING.

Support:

Warranty: All disc drives sold by Chase Data Ltd come with a full one-year warranty on parts & labour with optional extended warranty on all drives.

Extended Warranty
Your Insurance of trouble free operation.
When ordering your disc drive, ask about our second and third year extended warranty scheme. This covers ALL PARTS AND LABOUR and costs from as little as £15.00 on single drives and £23.00 on dual drives.

Non-Warranty Service: As the experts in our field, we can offer service on most makes of floppy disc drive.
Recalibration & Alignment... **£25** per unit inc. VAT (parts extra).
Phone for details: **(Tel: 0784-38487).**

Payment:
By Post:
Send your remittance (cheques only please) with your order to:

CHASE DATA

Chase Date Limited,
Unit 2, Crabtree Road, Thorpe Industrial Estate,
Egham, Surrey, TW20 8RN.
By Phone: **(Tel: 0784-38487).** Allow up to 21 days for delivery.

Mouse Organ listing

From Page 35

```
   10 REM ***************************
   20 REM *      MOUSE ORGAN        *
   30 REM * For use with BBC micro  *
   40 REM *      and AMX Mouse.     *
   50 REM *   Geoff Turner  1985    *
   60 REM *   (C) THE MICRO USER    *
   70 REM ***************************
   80 ON ERROR GOTO 5680
   90 MODE 4
  100 PROCinitialise
  110 PROCscreen
  120 *SHOWPOINTER
  130 REPEAT
  140 REPEAT
  150 *MOVEPOINTER
  160 UNTIL NOT INKEY(-129)
  170 PROCbutton
  180 UNTIL FALSE
  190 END
  200 REM********************************
  210 REM INITIALISE VARIABLES
  220 DEFPROCinitialise
  230 *POINTER 80,81
  240 E%=1:D%=20:F%=1:T%=3:R%=0
  250 note%=0:pb%=0:ed%=0:edit%=0
  260 DIM F%(7),N%(999)
  270 FOR I%=0 TO 6
  280 READ F%(I%)
  290 NEXT
  300 DATA 1,5,13,21,25,33,41
  310 DIM P%(4,13)
  320 FOR J%=1 TO 4
  330 FOR I%=1 TO 13
  340 READ P%(J%,I%)
  350 NEXT
  360 NEXT
  370 DATA 1,0.0,0,0,0,0;20,0,-10,-10
0,120,0
  380 DATA 10,0,0,0,0,0,0,126,126,-20
,-50,120,50
  390 DATA 8,1,1,1,1,1,1,20,0,-10,-10
,120,0
  400 DATA 3,1,1,1,1,1,1,126,0,0,-50,
100,100
  410 DIM P$(13)
  420 FOR I=2 TO 13
  430 READ P$(I)
  440 NEXT
  450 DATA P1,P2,P3,N1,N2,N3,AA,AD,AS
,AR,ALA,ALD
  460 DIM min(13),max(13)
  470 FOR I=2 TO 13
  480 READ min(I)
  490 NEXT
  500 FOR I=2 TO 13
  510 READ max(I)
  520 NEXT
  530 DATA -128,-128,-128,0,0,0,-127,
-127,-127,-127,0,0
  540 DATA 127,127,127,255,255,255,12
7,127,0,0,126,126
  550 PROCenvelope
  560 ENDPROC
  570 REM********************************
  580 REM SET UP SCREEN DISPLAY
  590 DEFPROCscreen
  600 *DESK
  610 *WINDOW 1,24,38,19
  620 FOR I%=32 TO 1272 STEP 32
  630 MOVE I%,416
  640 DRAW I%,224
  650 NEXT
  660 C%=0
  670 GCOL0,128
  680 FOR X%=76 TO 1224 STEP 32
  690 C%=C%+1
  700 IF C%=3 OR C%=7 THEN 770
  710 IF C%=8 THEN C%=1
  720 MOVE X%,416
  730 DRAW X%,320
  740 PLOT 85,X%+20,416
  750 DRAW X%+20,320
  760 PLOT 85,X%,320
  770 NEXT
  780 *WINDOW 1,26,38,26
  790 VDU26
  800 N$="BCDEFGA"
  810 PRINT TAB(1,26);STRING$(5,N$);
  820 PRINT"BCD";
  830 *WINDOW 1,13,38,1
  840 PRINTTAB(1,1)"ENVELOPE";
  850 PRINTTAB(19,1);"STEP TIME";
  860 PRINTTAB(2,4);P$(2)
  870 PRINTTAB(8,4);P$(3)
  880 PRINTTAB(14,4);P$(4)
  890 PRINTTAB(20,4);P$(5)
  900 PRINTTAB(26,4);P$(6)
  910 PRINTTAB(32,4);P$(7)
  920 PRINTTAB(2,9);P$(8)
  930 PRINTTAB(8,9);P$(9)
  940 PRINTTAB(14,9);P$(10)
  950 PRINTTAB(20,9);P$(11)
  960 PRINTTAB(26,9);P$(12)
  970 PRINTTAB(32,9);P$(13)
  980 VDU5
  990 MOVE 48,975
 1000 PROCiconstwo
 1010 MOVE 48,879
 1020 PROCicons
 1030 MOVE 48,815
 1040 PROCicons
 1050 MOVE 48,719
 1060 PROCicons
 1070 MOVE 48,655
 1080 PROCicons
 1090 VDU4
 1100 VDU26
 1110 PROCparameters
 1120 *WINDOW 1,17,38,15
 1130 VDU5
 1140 MOVE 48,527
 1150 PROCiconstwo
 1160 VDU4
 1170 VDU26
 1180 PRINT TAB(2,16);"DURATION";
 1190 PRINT TAB(20,16);"EFFECT";
 1200 PRINTTAB(16,16);D%
 1210 PRINTTAB(34,16);F%
 1220 PROCstore
 1230 ENDPROC
 1240 REM********************************
 1250 REM DISPLAY ICONS
 1260 DEFPROCicons
 1270 FOR I=1 TO 6
 1280 *ICON 77
 1290 *ICON 78
 1300 *ICON 79
 1310 NEXT:ENDPROC
 1320 REM********************************
 1330 REM DISPLAY ICONS
 1340 DEFPROCiconstwo
 1350 FOR I=1 TO 2
 1360 *ICON 77
 1370 *ICON 78
 1380 *ICON 78
 1390 *ICON 78
 1400 *ICON 78
 1410 *ICON 79
 1420 *ICON 77
 1430 *ICON 78
 1440 *ICON 79
 1450 NEXT
 1460 ENDPROC
 1470 REM*****************************
 1480 REM DISPLAY MEMORY WINDOW
 1490 DEFPROCstore
 1500 *WINDOW 1,30,38,28
 1510 VDU26
 1520 PRINT TAB(2,29);"REC"
 1530 PRINT TAB(6,29);note%
 1540 PRINT TAB(10,29);"ERA"
 1550 PRINT TAB(14,29);"P/B"
 1560 PRINT TAB(18,29);pb%
 1570 PRINT TAB(22,29);"EDIT"
 1580 PRINT TAB(28,29);"LOAD-SAVE"
 1590 PRINT TAB(33,29);"SAVE"
 1600 VDU5
 1610 MOVE 48,108
 1620 FOR I=1 TO 5
 1630 *ICON 77
 1640 *ICON 79
 1650 NEXT
 1660 *ICON 77
 1670 *ICON 78
 1680 *ICON 79
 1690 *ICON 77
 1700 *ICON 78
 1710 *ICON 78
 1720 *ICON 78
 1730 *ICON 79
 1740 VDU4
 1750 VDU23,1,0;0;0;0;
 1760 ENDPROC
 1770 REM****************************
 1780 REM IDENTIFY FUNCTION
 1790 DEFPROCbutton
 1800 *UPDATE
 1810 IF VPOS>18 AND VPOS<25 THEN PRO
Cmusic:ENDPROC
 1820 IF VPOS=2 AND POS>13 AND POS<19
 THEN PROCchange:ENDPROC
 1830 IF VPOS=2 AND POS>31 AND POS<37
 THEN PROCstep:ENDPROC
 1840 IF VPOS=7 OR VPOS=12 THEN PROCp
itchamp:ENDPROC
 1850 IF VPOS=16 AND POS>13 AND POS<1
9 THEN PROCduration:ENDPROC
 1860 IF VPOS=16 AND POS>31 AND POS<3
7 THEN PROCeffect:ENDPROC
 1870 IF VPOS=29 PROCmemorv:ENDPROC
 1880 ENDPROC
 1890 REM****************************
 1900 REM PLAY NOTE
 1910 DEFPROCmusic
 1920 IF POS<1 OR POS>38 ENDPROC
 1930 P%=POS-1:V%=VPOS
 1940 N%=48*(P% DIV 7)+F%(P% MOD 7)
 1950 IF V%<22 THEN IF P% MOD 7<>3 AN
D P%MOD 7<>0 AND P%<>37 THEN N%=N%+4
 1960 IF ed%=0 THEN IF R%=1 THEN IF n
ote%<999 THEN note%=note%+1:N%(note%)
=N%:PRINTTAB(6,29);note%
 1970 IF ed%=1 THEN IF R%=1 THEN N%(e
dit%)=N%
 1980 IF F%=1 SOUND &11,E%,N%,D%
 1990 IF F%=2 SOUND &111,1,N%,D%:SOUN
D &112,2,N%,D%
 2000 IF F%=3 SOUND &211,1,N%,D%:SOUN
D &212,2,N%,D%:SOUND &213,3,N%,D%
 2010 IF R%=1 THEN REPEAT:UNTIL INKEY
(-129)
 2020 ENDPROC
 2030 REM****************************
 2040 REM DEFINE ENVELOPES
 2050 DEFPROCenvelope
 2060 ON E% GOTO 2070,2080,2090,2100
 2070 ENVELOPE 1,P%(1,1),P%(1,2),P%(1
,3),P%(1,4),P%(1,5),P%(1,6),P%(1,7),P
%(1,8),P%(1,9),P%(1,10),P%(1,11),P%(1
,12),P%(1,13):ENDPROC
 2080 ENVELOPE 2,P%(2,1),P%(2,2),P%(2
,3),P%(2,4),P%(2,5),P%(2,6),P%(2,7),P
%(2,8),P%(2,9),P%(2,10),P%(2,11),P%(2
,12),P%(2,13):ENDPROC
 2090 ENVELOPE 3,P%(3,1),P%(3,2),P%(3
,3),P%(3,4),P%(3,5),P%(3,6),P%(3,7),P
%(3,8),P%(3,9),P%(3,10),P%(3,11),P%(3
,12),P%(3,13):ENDPROC
 2100 ENVELOPE 4,P%(4,1),P%(4,2),P%(4
,3),P%(4,4),P%(4,5),P%(4,6),P%(4,7),P
%(4,8),P%(4,9),P%(4,10),P%(4,11),P%(4
,12),P%(4,13):ENDPROC
 2110 REM****************************
 2120 REM DISPLAY PARAMETERS
 2130 DEFPROCparameters
 2140 PRINTTAB(16,2);E%
 2150 PRINTTAB(34,2);SPC(3);
 2160 PRINTTAB(34,2);P%(E%,1)
 2170 FOR I%=1 TO 6
 2180 PRINTTAB(6*(I%-1)+2,7);SPC(5);
 2190 PRINTTAB(6*(I%-1)+3,7);P%(E%,I%
+1);
 2200 PRINTTAB(6*(I%-1)+2,12);SPC(5);
 2210 PRINTTAB(6*(I%-1)+3,12);P%(E%,I
%+7);
 2220 NEXT
 2230 ENDPROC
 2240 REM****************************
 2250 REM CHANGE ENVELOPE
 2260 DEFPROCchange
 2270 *HIDEPOINTER
 2280 COLOUR 129:COLOUR 0
 2290 PRINTTAB(2,2);SPC(11);
 2300 PRINTTAB(2,2);"ENVELOPE";
 2310 PRINTTAB(14,2);SPC(5);
 2320 PRINTTAB(16,2);E%;
 2330 REPEAT:UNTIL INKEY(-129)
 2340 REPEAT
 2350 IF INKEY(-107) THEN E%=E%+1
 2360 IF INKEY(-109) THEN E%=E%-1
 2370 IF E%=5 THEN E%=1
 2380 IF E%=0 THEN E%=4
 2390 PRINTTAB(16,2);E%;
 2400 FOR delay=1 TO 300:NEXT
 2410 UNTIL INKEY(-108)
 2420 COLOUR 128:COLOUR 1
 2430 PRINTTAB(2,2);SPC(11);
 2440 PRINTTAB(2,2);"ENVELOPE";
 2450 PRINTTAB(14,2);SPC(5);
 2460 PRINTTAB(16,2);E%;
 2470 PROCenvelope
 2480 PROCparameters
 2490 *SHOWPOINTER
 2500 REPEAT:UNTIL INKEY(-129)
 2510 ENDPROC
 2520 REM****************************
 2530 REM CHANGE STEP
 2540 DEFPROCstep
 2550 *HIDEPOINTER
 2560 COLOUR 129:COLOUR 0
 2570 PRINTTAB(20,2);SPC(11);
 2580 PRINTTAB(20,2);"STEP TIME";
 2590 PRINTTAB(32,2);SPC(5);
 2600 PRINTTAB(34,2);P%(E%,1);
 2610 REPEAT:UNTIL INKEY(-129)
 2620 REPEAT
 2630 IF INKEY(-107) THEN P%(E%,1)=P%
(E%,1)+1
 2640 IF INKEY(-109) THEN P%(E%,1)=P%
(E%,1)-1
 2650 IF P%(E%,1)=256 THEN P%(E%,1)=1
 2660 IF P%(E%,1)=0 THEN P%(E%,1)=255
 2670 PRINTTAB(32,2);SPC(5);
 2680 PRINTTAB(34,2);P%(E%,1);
 2690 FOR delay=1 TO 300:NEXT
 2700 UNTIL INKEY(-108)
 2710 COLOUR 128:COLOUR 1
 2720 PRINTTAB(20,2);SPC(11);
 2730 PRINTTAB(20,2);"STEP TIME";
 2740 PRINTTAB(32,2);SPC(5);
 2750 PRINTTAB(34,2);P%(E%,1);
 2760 PROCenvelope
 2770 *SHOWPOINTER
 2780 REPEAT:UNTIL INKEY(-129)
 2790 ENDPROC
 2800 REM****************************
 2810 REM CHANGE PARAMETERS
 2820 DEFPROCpitchamp
 2830 IF VPOS=7 THEN P%=2 ELSE P%=8
 2840 Q%=(POS+5)/6
 2850 P%=P%+Q%-1
 2860 IF P%<2 THEN P%=2
 2870 IF P%>13 THEN P%=13
 2880 *HIDEPOINTER
 2890 COLOUR 129:COLOUR 0
 2900 IF P%<8 PRINTTAB((P%-2)*6+2,VPO
S-2);SPC(5);TAB((P%-2)*6+3,VPOS);P$(P
%);
 2910 IF P%>7 PRINTTAB((P%-8)*6+2,VPO
S-2);SPC(5);TAB((P%-8)*6+3,VPOS);P$(P
%);
 2920 IF P%<8 PRINTTAB((P%-2)*6+2,VPO
S+2);SPC(5);TAB((P%-2)*6+3,VPOS);P%(E
%,P%);
 2930 IF P%>7 PRINTTAB((P%-8)*6+2,VPO
S+2);SPC(5);TAB((P%-8)*6+3,VPOS);P%(E
%,P%);
 2940 REPEAT:UNTIL INKEY(-129)
 2950 REPEAT
 2960 IF INKEY(-107) THEN P%(E%,P%)=P
%(E%,P%)+1
 2970 IF INKEY(-109) THEN P%(E%,P%)=P
%(E%,P%)-1
 2980 IF P%(E%,P%)<min(P%) THEN P%(E%
,P%)=max(P%)
```

→

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LEE COMPUTERS B'HAM ***LEE COMPUTERS B'HAM***

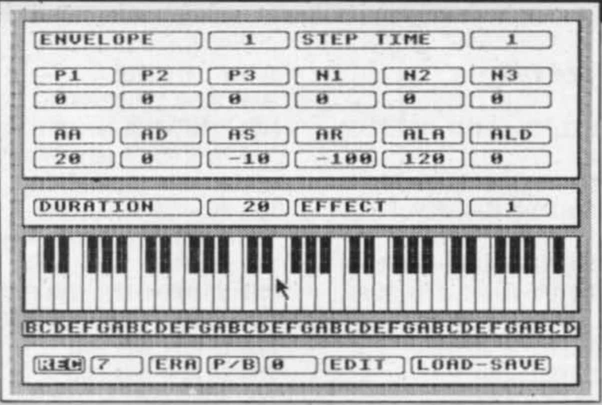
Mouse Organ listing

From Page 143

```
 2990 IF P%(E%,P%)>max(P%) THEN P%(E%
,P%)=min(P%)
 3000 IF P%<8 PRINTTAB((P%-2)*6+2,VPO
S);SPC(5);TAB((P%-2)*6+3,VPOS);P%(E%,
P%);
 3010 IF P%>7 PRINTTAB((P%-8)*6+2,VPO
S);SPC(5);TAB((P%-8)*6+3,VPOS);P%(E%,
P%);
 3020 FOR DELAY=1 TO 300:NEXT
 3030 UNTIL INKEY(-108)
 3040 COLOUR 128:COLOUR 1
 3050 IF P%<8 PRINTTAB((P%-2)*6+2,VPO
S);SPC(5);TAB((P%-2)*6+3,VPOS);P%(E%,
P%);
 3060 IF P%>7 PRINTTAB((P%-8)*6+2,VPO
S);SPC(5);TAB((P%-8)*6+3,VPOS);P%(E%,
P%);
 3070 IF P%<8 PRINTTAB((P%-2)*6+2,VPO
S-2);SPC(5);TAB((P%-2)*6+3,VPOS);P$(P
%);
 3080 IF P%>7 PRINTTAB((P%-8)*6+2,VPO
S-2);SPC(5);TAB((P%-8)*6+3,VPOS);P$(P
%);
 3090 PROCenvelope
 3100 *SHOWPOINTER
 3110 REPEAT:UNTIL INKEY(-129)
 3120 ENDPROC
 3130 REM******************************
 3140 REM CHANGE DURATION
 3150 DEFPROCduration
 3160 *HIDEPOINTER
 3170 COLOUR 129:COLOUR 0
 3180 PRINTTAB(2,16);SPC(11);
 3190 PRINTTAB(2,16);"DURATION";
 3200 PRINTTAB(14,16);SPC(5);
 3210 PRINTTAB(16,16);D%;
 3220 REPEAT:UNTIL INKEY(-129)
 3230 REPEAT
 3240 IF INKEY(-107) THEN D%=D%+1
 3250 IF INKEY(-109) THEN D%=D%-1
 3260 IF D%=256 THEN D%=1
 3270 IF D%=0 THEN D%=255
 3280 PRINTTAB(14,16);SPC(5);
 3290 PRINTTAB(16,16);D%;
 3300 FOR DELAY=1 TO 300:NEXT ←
 3310 UNTIL INKEY(-108)
 3320 COLOUR 128:COLOUR 1
 3330 PRINTTAB(2,16);SPC(11);
 3340 PRINTTAB(2,16);"DURATION";
 3350 PRINTTAB(14,16);SPC(5);
 3360 PRINTTAB(16,16);D%;
 3370 *SHOWPOINTER
 3380 REPEAT:UNTIL INKEY(-129)
 3390 ENDPROC
 3400 REM******************************
 3410 REM CHANGE EFFECTS
 3420 DEFPROCeffect
 3430 *HIDEPOINTER
 3440 COLOUR 129:COLOUR 0
 3450 PRINTTAB(20,16);SPC(11);
 3460 PRINTTAB(20,16);"EFFECT";
 3470 PRINTTAB(32,16);SPC(5);
 3480 PRINTTAB(34,16);F%;
 3490 REPEAT:UNTIL INKEY(-129)
 3500 REPEAT
 3510 IF INKEY(-107) THEN F%=F%+1
 3520 IF INKEY(-109) THEN F%=F%-1
 3530 IF F%=4 THEN F%=1
 3540 IF F%=0 THEN F%=3
 3550 PRINTTAB(32,16);SPC(5);
 3560 PRINTTAB(34,16);F%;
 3570 FOR DELAY=1 TO 300:NEXT
 3580 UNTIL INKEY(-108)
 3590 COLOUR 128:COLOUR 1
 3600 PRINTTAB(20,16);SPC(11);
 3610 PRINTTAB(20,16);"EFFECT";
 3620 PRINTTAB(32,16);SPC(5);
 3630 PRINTTAB(34,16);F%;
 3640 *SHOWPOINTER
 3650 REPEAT:UNTIL INKEY(-129)
 3660 ENDPROC
 3670 ******************************
 3680 REM MEMORY FUNCTIONS
 3690 DEFPROCmemory
 3700 IF ed%=1 THEN 3750
 3710 IF POS>1 AND POS<5 THEN PROCrec
ord
 3720 IF POS>13 AND POS<17 THEN PROCp
lay
 3730 IF POS>27 AND POS<32 THEN PROCl
oad
 3740 IF POS>32 AND POS<37 THEN PROCs
ave
 3750 IF POS>9 AND POS<13 AND ed%=0 T
HEN PROCerase
 3760 IF POS>9 AND POS<13 AND ed%=1 A
ND edit%>0 THEN PROCwipe
 3770 IF POS>21 AND POS<26 THEN PROCe
dit
 3780 ENDPROC
 3790 REM****************************
 3800 REM RECORD NOTES
 3810 DEFPROCrecord
 3820 *HIDEPOINTER
 3830 IF R%=1 THEN COLOUR 128:COLOUR
1
 3840 IF R%=0 THEN COLOUR 129:COLOUR
0
 3850 IF R%=1 THEN R%=0 ELSE R%=1
 3860 PRINTTAB(2,29);"REC"
 3870 REPEAT:UNTIL INKEY(-129)
 3880 COLOUR 128:COLOUR 1
 3890 *SHOWPOINTER
 3900 ENDPROC
 3910 REM****************************
 3920 REM PLAYBACK NOTES
 3930 DEFPROCplay
 3940 IF note%=0 ENDPROC
 3950 IF R%=1 PROCrecord
 3960 *HIDEPOINTER
 3970 COLOUR 129:COLOUR 0
 3980 PRINTTAB(14,29);"P/B"
 3990 I=0
 4000 REPEAT
 4010 I=I+1
 4020 N%=N%(I)
 4030 COLOUR 128:COLOUR 1
 4040 REPEAT:UNTIL INKEY(-129)
 4050 REPEAT:UNTIL NOT INKEY(-129)
 4060 IF I>note% THEN 4120
 4070 IF F%=1 SOUND &11,E%,N%,D%
 4080 IF F%=2 SOUND &111,1,N%,D%:SOUN
D &112,2,N%,D%
 4090 IF F%=3 SOUND &211,1,N%,D%:SOUN
D &212,2,N%,D%:SOUND &213,3,N%,D%
 4100 PRINTTAB(18,29);SPC(3)
 4110 PRINTTAB(18,29);I
 4120 UNTIL I=note%+1 OR INKEY(-108)
 4130 PRINTTAB(14,29);"P/B"
 4140 PRINTTAB(18,29);SPC(3)
 4150 PRINTTAB(18,29);"0"
 4160 REPEAT:UNTIL INKEY(-129)
 4170 *FX15,0
 4180 *SHOWPOINTER
 4190 ENDPROC
 4200 REM****************************
 4210 REM ERASE NOTES
 4220 DEFPROCerase
 4230 IF note%=0 THEN ENDPROC
 4240 *HIDEPOINTER
 4250 COLOUR 129:COLOUR 0
 4260 PRINTTAB(10,29);"ERA"
 4270 FOR I=1 TO note%
 4280 N%(I)=0
 4290 NEXT
 4300 note%=0
 4310 COLOUR 128:COLOUR 1
 4320 PRINTTAB(6,29);SPC(3);
 4330 PRINTTAB(6,29);note%
 4340 PRINTTAB(10,29);"ERA"
 4350 *SHOWPOINTER
 4360 ENDPROC
 4370 REM****************************
 4380 REM EDIT NOTES
 4390 DEFPROCedit
 4400 IF note%=0 THEN ed%=0:R%=0:ENDP
ROC
 4410 IF ed%=1 THEN 4650 ELSE ed%=1
 4420 IF R%=0 PROCrecord
 4430 *HIDEPOINTER
 4440 COLOUR 129:COLOUR 0
 4450 PRINTTAB(22,29);"EDIT"
 4460 REPEAT:UNTIL INKEY(-129)
```

→

Mouse Organ listing



```
ENVELOPE   1   STEP TIME   1
P1  P2  P3  N1  N2  N3
0   0   0   0   0   0
AA  AD  AS   AR    ALA  ALD
20  0   -10  -100  120  0
DURATION   20   EFFECT   1
BCDEFGABCDEFGABCDEFGABCDEFGABCDEFGABCD
REC 7  ERA  P/B 0  EDIT  LOAD-SAVE
```

From Page 145

```
4470 COLOUR 128:COLOUR 1
4480 PRINTTAB(18,29);"0";SPC(2)
4490 edit%=0
4500 REPEAT
4510 REPEAT:UNTIL NOT INKEY(-129)
4520 IF INKEY(-109) edit%=edit%-1
4530 IF INKEY(-107) edit%=edit%+1
4540 IF INKEY(-108) THEN 4610
4550 IF edit%<1 THEN edit%=note%
4560 IF edit%>note% THEN edit%=0
4570 PRINTTAB(18,29);SPC(3)
4580 PRINTTAB(18,29);edit%
4590 REPEAT:UNTIL  INKEY(-129)
4600 SOUND &11,E%,N%(edit%),D%
4610 UNTIL INKEY(-108)
4620 *SHOWPOINTER
4630 ENDPROC
4640 REM END EDITING
4650 *HIDEPOINTER
4660 PRINTTAB(18,29);SPC(3)
4670 PRINTTAB(18,29);"0"
4680 PRINTTAB(22,29);"EDIT"
4690 ed%=0
4700 REPEAT:UNTIL INKEY(-129)
4710 *SHOWPOINTER
4720 PROCrecord
4730 ENDPROC
4740 REM*****************************
4750 REM LOAD DATAFILE
4760 DEFPROCload
4770 *WINDOW 1,30,38,28
4780 PRINT
4790 INPUT"FILE NAME (or RETURN) ? "
F$
4800 IF F$="" THEN PROCstore:ENDPROC
4810 X=OPENUP(F$)
4820 INPUT#X,note%
4830 FOR I=1 TO note%
4840 INPUT#X,N%(I)
4850 NEXT
4860 CLOSE#X
4870 PROCstore
4880 ENDPROC
4890 REM*****************************
4900 REM SAVE DATAFILE
4910 DEFPROCsave
4920 IF note%=0 THEN ENDPROC
4930 *WINDOW 1,30,38,28
4940 PRINT
4950 INPUT"FILE NAME (or RETURN) ? "
F$
4960 IF F$="" THEN PROCstore:ENDPROC
4970 X=OPENOUT(F$)
4980 PRINT#X,note%
4990 FOR I=1 TO note%
5000 PRINT#X,N%(I)
5010 NEXT
5020 CLOSE#X
5030 PROCstore
5040 ENDPROC
5050 REM*****************************
5060 REM EDIT/ERASE
5070 DEFPROCwipe
5080 *HIDEPOINTER
5090 wp%=1
5100 *WINDOW 1,30,38,28
5110 VDU26
5120 VDU5
5130 MOVE 48,108
5140 *ICON 77
5150 *ICON 78
5160 *ICON 78
5170 *ICON 78
5180 *ICON 78
5190 *ICON 78
5200 *ICON 78
5210 *ICON 79
5220 *ICON 77
5230 *ICON 78
5240 *ICON 78
5250 *ICON 78
5260 *ICON 78
5270 *ICON 78
5280 *ICON 78
5290 *ICON 78
5300 *ICON 78
5310 *ICON 79
5320 VDU4
5330 VDU23,1,0;0;0;0;
5340 PRINT
5350 PRINTTAB(2,29);"ERASE NOTE ";ed
it%;
5360 PRINTTAB(18,29);"ERASE  ";edit%
;" TO ";note%
5370 *SHOWPOINTER
5380 REPEAT
5390 REPEAT
5400 *MOVEPOINTER
5410 UNTIL NOT INKEY(-129)
5420 *UPDATE
5430 UNTIL VPOS=29 AND POS>1 AND POS
<37
5440 IF POS>1 AND POS<17 THEN PROCwi
peone:GOTO 5460
5450 IF POS>17 AND POS<37 THEN PROCw
ipeend
5460 wp%=0
5470 *HIDEPOINTER
5480 PROCstore
5490 *SHOWPOINTER
5500 PROCedit
5510 ENDPROC
5520 REM*****************************
5530 REM ERASE ONE NOTE
5540 DEFPROCwipeone
5550 FOR I=edit% TO note%-1
5560 N%(I)=N%(I+1)
5570 NEXT
5580 IF note%>0 THEN note%=note%-1
5590 ENDPROC
5600 REM*****************************
5610 REM ERASE TO END
5620 DEFPROCwipeend
5630 FOR I=edit% TO note%
5640 N%(I)=0
5650 NEXT
5660 note%=edit%-1
5670 ENDPROC
5680 REM ***************************
5690 REM ERROR HANDLING
5700 IF ERR=204 AND ERL=4810 PROCloa
d:GOTO 120
5710 IF ERR=204 AND ERL=4970 PROCsav
e:GOTO 120
5720 IF ERR=222 AND ERL=4820 PROCloa
d:GOTO 120
5730 ON ERROR OFF
5740 MODE 7
5750 REPORT
5760 PRINT" at ";ERL
5770 END
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

Softlife

GET IT RIGHT FIRST TIME – AND FAST

Specially designed for the BBC Micro, the Softlife Numeric Keypad allows the speedy entry of numeric data for business, educational, scientific, or home purposes, saving time and avoiding annoying (and expensive!) keying errors.

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- Second processor compatible

Softlife
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- Easily connected to the BBC Micro

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Alastair France B.A.
Softlife Ltd 7 Rose Crescent
Cambridge CB2 3LL

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Control Dataset SS/DD 48 tpi £10.90 Per Box

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Get more out of your BBC Micro with the New Marconi RB2 Tracker Ball

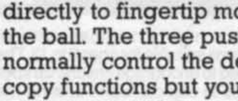
Marconi's new Tracker Ball is superior to either a mouse or joystick and is easier to use. The RB2 design incorporates Marconi's vast experience in making Tracker Balls for Air Traffic Control and professional equipments which demand maximum performance and reliability. It is drift free and gives more precise positional control - the cursor position on screen relates directly to fingertip movement on the ball. The three push buttons normally control the delete, return and copy functions but you can also assign your own functions to the buttons.

Marconi RB2

It's perfect, whether your micro is your hobby, an educational tool or a source of low cost CAD/CAM applications. It's ideal for word processing and games too, and unlike a mouse needs no regular cleaning.

Available from most Computer Dealers or from Central Trade Exchange Ltd.

ONLY £59.50 Inc. VAT



FREE!

Utilities Program.
Graphics Program for tape or disk.
Micro Draw Program on floppy disk.

To: Central Trade Exchange Ltd.,
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Tel: 0582 61283.
Please send details of the new Marconi Tracker Ball.

Name: __________

Address: __________

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CLARES Nº1 IN UTILITY SOFTWARE!

Enhanced BETA-BASE £25

40 80 3"

WHAT IS A DATABASE?
It is a FILE containing RECORDS, each record consists of a number of FIELDS containing the information—an analogy can be drawn with a card index in which a box of cards is the file, each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access	— disc based, single or dual drives.
2) File Sizes	— max 65,000 records.
3) Record Size	— up to a 2048 characters and 200 fields.
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5) Holds	— approx 1200 ADDRESS records per 100k.
6) Search	— 5 search fields using powerful options.
7) Sort	— 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

★ CALCULATE—using any valid expression and store results.
★ POWERFUL PRINTOUT OPTION—eliminates need for separate mailing program, parallel/Serial Printout allows setting of printer control codes, line spacing, tabulation, Headings etc., plus label printing with horizontal and vertical tab control.
★ REDEFINE—Titles, field widths, number of fields, number of records etc.
★ TRANSFER—Records from one file to another.
★ SEARCH LISTS—Allow creation of sub Databases within main Database.
★ GLOBAL ENTRY—provides easy entry of repetitive data and a powerful global edit/update facility that will save hours of typing.
★ SPOOLER—enables you to create spooled files that are compatible with Wordwise, View and other word processors. The spooler program will allow you to format your spooled file in the same way as the powerful printout option. You can therefore have headings, columns, titles, numbers etc.
★ INPUT—is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the coming utilities disc were written using this procedure.
★ TUBE—compatible with the 6502 second processor.
★ Comprehensive manual and tutorial.

Beta-Base Utilities disc containing many advanced features such as full disc sort, AND/OR search on 10 fields, wildcards, mail merge + many other features.

Available Now £12

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Clares
MICRO SUPPLIES

REPLICA II £12.00

40 80 3"

In addition to working with the standard single density DFS's REPLICA II is now compatible with the following double density DFS: OPUS 3.45, UDM v. 2.00 and CUMANA QFS.

The original REPLICA set a very high standard so the specification that we set our chief programmer presented him with a real challenge. In fact REPLICA II is now 2 separate programs, one for DFS using the 8271 controller and the other for the various DDFS that fully implement OSWORD &7F. REPLICA II will transfer many of your cassette based programs to disc, even more than REPLICA did. Now when you buy disc drives you do not have to throw away your expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &E00, those with up to 9 sections and those up to &6E in length e.g. adventure programs. No more waiting for 6 minutes whilst your adventure programs load.

REPLICA II is very easy to use and the user just enters a name, how many sections and whether CHAIN, *RUN or *LOAD is used to load the first section. Press play and let the program do the rest, even a menu. Just think how much it will cost you to buy a disc version of your favourite program—it is probably more than REPLICA II, which will hold up to 16 programs, limited only by the disc capacity and catalogue.

STATE DFS & 40 or 80 tracks

New! PROFILE £12.00

40 80 3"

A PROCEDURE LIBRARY MANAGEMENT SYSTEM

Now you can start the procedure library that you always promised yourself. PROFILE allows you to store, list, merge and grab procedures without any of the headaches. Automatic alteration of LINE NUMBERS and resident variables such as TOP, LOMEM etc release you from the tedious chore of setting and resetting, checking and rechecking. PROFILE leaves you free to create your programs without disturbing your chain of thoughts.

★ 100 Procedures can be stored on each disc (disc space allowing)
★ NO LIMIT to the number of procedure discs used
★ MERGE Procedures into your programs easily
★ LIST Procedures from disc to check suitability etc
★ RENAME Procedures on disc
★ GRAB new Procedures from existing programs
★ NESTED Procedures can also be grabbed automatically

A Procedure can be a FUNCTION, a BASIC program or part of it or a PROCEDURE.

With PROFILE you will quickly amass a wealth of procedures which will enable you to write programs quickly and easily. Simply write the controlling program containing the procedure calls and PROFILE will merge the procedures for you.

PROFILE in effect provides you with a MACRO BASIC in which you only have to define the procedure once and it can be re-used automatically thereafter.

Make life easier for yourself and order PROFILE today.

**98 Middlewich Rd.,
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Tel: 0606 48511
Open 9—5pm Monday—Friday
LUNCH 12.30—1.30**

New! BETA-ACCOUNTS INVOICE & DELIVERY NOTE MODULE £25.00

40 80 3"

This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Account customer details are inserted automatically and delivery notes generated automatically when required. Customer details without account numbers can be automatically placed in a Beta-Base compatible file for use as a mailing list.

A sales ledger sheet is printed automatically when there is enough data to fill a page, alternatively the user can print the ledger sheet before a full page to suit his needs. VAT details are generated at the end of the VAT period and the year to date figures can be viewed at any time. Provision is made for multiple VAT rates including standard, zero, export and exempt.

A transaction file is generated for account customers for use with the STATEMENTS and ACCOUNTS RECEIVABLE module.

Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER. All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. A Beta-Base Utilities Disc will soon be available and will provide Mail-Merge facilities and links into ULTRACALC plus many other features.

★ INTEGRATED ACCOUNTS and DATABASE
★ MULTIPLE VAT rates
★ SCREEN EDITING with insert & overwrite
★ AUTOMATIC DELIVERY NOTES
★ INVOICE COMMENTS
★ ACCOUNT HOLDERS details inserted automatically
★ MAILING LIST generated automatically
★ LEDGER SHEET printed automatically
★ VAT sales returns prepared
★ TRANSACTION FILE generated
★ Beta-Base compatible

This program was written for our own use and is used to prepare hundreds of invoices per week. It has no unnecessary questions or keys to press and extensive but easy edit options, we have made life as easy as possible for ourselves so why not take advantage of our efforts.

Requires double sided single or twin single sided drives for minimum configuration -no stock control or customer database. Double sided twin drives will enable a full integrated system to be used.

FUN HOUSE £10.00

40 80 3"

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

Send for detailed newsletter.
All prices inclusive of VAT & Carriage—
NO EXTRAS! Please state 40 or 80 track disc and state which D.F.S. you use

BROM

21 EXTRA COMMANDS

THE NUMBER ONE

TOOLKIT ROM
FROM CLARES

BROM £34.50 40 80 ○ 3" £27.50

BROM is the first toolkit ROM to provide a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

Closely related to the EDITOR is the EXTENDED ERROR HANDLING which will trap errors in a program and enter the EDITOR at the line generating the error, not only that but it will also position the cursor as near to the statement causing the error as possible, no more wading through multi statement lines trying to identify the error.

Commands unique to BROM are:

ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK, very useful for avoiding clashes especially for users with second processors. This also works with the DFS and reverts to PAGE &E00 automatically.

CASE which forces input into upper or lower case irrespective of caps/shift lock.

FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS.'

ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.

Another group of commands provide FIND and selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. "*FIND PROChelp T", will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.

The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.

This is a genuinely useful ROM that no user should be without. Be warned, once used you will not be able to live without it!

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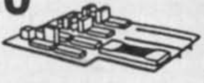

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MICROMAIL

Waging war with the 'friendly' BBC

I AM a much confused BBC B owner. I avidly read your magazine in the hope that I may glean some inkling of information and "BBCability".

Firstly I find the User Guide totally incomprehensible – until I have spent several computer hours finding out what question I am trying to resolve.

Secondly I experience terrible troubles in saving and loading programs. I have ditched three portable cassette recorders on a "blow the expense buy a purpose made machine" basis and now have a W.H. Smith Computer Program Data Recorder but to no avail.

I learned only this week from a Commodore friend that the TV set should be set apart from the recorder because of interference and it does help.

I have now learned to keep rewinding numerous times when a beep and "Data?" signals appear and two hours later upon hitting Break I actually get back what I have previously saved.

Was the slowed down playback a result of something in the program? Or was it my W.H. Smith recorder?

I know that I do not fall into the category of Super Wally of Gloucestershire in that I have spent 2½ plus years making an Osborne 1 perform any trick in Supercalc and have a massive number of programs on cassette for the BBC Micro gleaned from magazines, books and friends.

But I am still of the opinion that I am at war with this "user friendly" machine.

I often get so excited that persistence has paid off and I successfully get a program to re-load AND run that I despatch it with my 10-year-old daughter, Christie, to school the next day, only to receive the reply that "We couldn't load it, why don't you get a disc drive?"

Is it really me?

I would truly appreciate any help you or your readers may have to offer because I am certain that BBC life ought to be enjoyable.

Perhaps you could also enlighten me on the viability and/or continued existence of the Hobbit floppy tape, or any other option to ensure successful retrieval of multi-hour program writing. – **A.P. Cameron-Tillett, Selsey, Stroud.**

● All we can offer you is the following advice:

○ Try the recorder out on another micro with different leads if possible – this will eliminate the cassette deck/lead fault.

○ Try more expensive cassette tapes – quality is important.

○ Save programs more than once even at different baud rates. See page 416 of the User Guide for the *TAPE command.

The Hobbit as far as we know is no longer available.

Disc transfer

OCCASIONALLY when transferring Basic programs to disc, things such as your published listings that I had on cassette, the message "No such variable at line XXX" appears when reloading from disc.

For example, when listed, I might get:

```
 210 IF INKEY(-99) PROCOSC
LIOSCLIre:PROCetc
```

rather than:

```
 210 IF INKEY(-99) PROCfir
e:PROCetc
```

This is no problem to rectify, as it stands out like a sore thumb. The program can be edited and re-saved. – A.P. Ranson, Swansea.

● We cannot explain why this should happen when simply transferring Basic programs from tape to disc.

Just to make sure you're doing it right, the steps you should take are as follows: Press Break, now enter *TAPE and LOAD"". When the program is loaded type *DISC then SAVE "filename", where "filename" is seven characters or less.

ROM gone missing

I RECENTLY bought a double sided disc drive and the disc interface with the latest Acorn 1.2 DNFS ROM and set about transferring my tape software onto disc.

I find that when loading some programs from Clares Replica and running them they seem to work OK. However when I press Ctrl+Break I completely "lose" my DFS ROM.

The usual Acorn DFS message does not appear on the screen and all CHAIN and LOAD commands start up the cassette motor.

Is it possible to "switch off" the DFS ROM? If so, how is it done and more importantly, how do I get it back as each time it disappears I have to resort to switching off the machine and then restarting it. – **Chris Searam, Clapton, London.**

● We know how to switch the DFS back on – *FX200,2 followed by Break. We are still mystified as to why the DFS is disabled under these circumstances.

Engineer's plea

IS there any software house that markets engineering software for the BBC B? By that I mean programs for, inter alia, thermodynamics and heat transfer, fluid dynamics, rotor dynamics and machine design.

While there is a host of frivolous software for this very versatile computer, it would appear that engineering software is not readily available for either practical or educational purposes.

Do the software houses only recognise the more expensive micros for serious applications? – **D.S.T. Raubenheimer, Wassenaar, The Netherlands.**

● We don't know of any commercial software that does what you ask, but knowing the vast numbers of BBC Micros in use in universities and polytechnics, we are sure that someone's come up with the sort of thing you want.

In fact, there are probably lots of programs written by our readers too limited in appeal to be commercial, yet offering the ideal solutions to other readers' problems.

If you've got your own specialised work of art, and want to share it with other readers, why not write in and let us know. – especially if it covers one of Mr Raubenheimer's subjects.

Problem solved

I WAS pleased and surprised to see my letter ("Data file problems") in the May 1985 issue of The Micro User.

Since then I have bought a 16k Solidisk, which, together with its attendant software, has solved both of the problems mentioned earlier.

The database program, Index, has solved the data file problem, that of indexing a datafile, and the excellent STLOE00 software – a DFS which has its workspace in sideways RAM – leaves PAGE at E00.

This means that your games can be loaded and played without needing to download, and, more importantly, the hi-score table can be saved to, and loaded from, disc.

This is rather trivial in itself but the idea can be adopted for

→

From Page 153

use with other games of this nature.

Anyone wanting details of the alterations in the program needed to save or load hi-scores to disc – or tape, if you have no E00 DFS – may contact me at the address below, but it really is quite simple, and your more accomplished readers will have no trouble.

I have found the Solidisk to be an excellent product, and recommend it. Indeed, I intend to expand my Solidisk from 16k to 128k as soon as possible.

In reply to Andrew Carter's letter in the same issue, I too am writing an adventure, in Basic.

I have found that it is advantageous, but by no means sophisticated, to divide the game into program "modules", which chain each other when necessary.

As well as the 26 resident integer variables A% . . . Z%, there is a bit of "spare" memory left by those nice people at Acorn between &70 and &8F inclusive, which can be used to store up to 256 binary (single-bit) variables.

This should be sufficient for his purpose, and if he contacts me directly I may be able to help him further. – **Stephen Murgan, 252 Grove Green Road, Leytonstone, London E11 4EN.**

Viewing !BOOT files

HERE are two quick tips for BBC users.

*The first is to use View to amend or create !BOOT files. To amend the file enter View by typing *WORD. Then type LOAD !BOOT. Press Escape.*

Your !BOOT file can then be edited. Leave an open line at the bottom of the amended file. Press Escape. Type SAVE !BOOT leaving a space between the E and the !.

To create a new !BOOT file enter View text writing mode, write the file, then SAVE it as above.

*You will find this especially useful when you have only a few bytes left on the disc and * BUILD !BOOT returns an error message "Disc full".*

The other tip concerns coloured REM statements. It is always useful to have REMs at the beginning of procedures and the colour helps them stand out.

To insert a coloured REM statement type REM", then type in the required control code by pressing Shift + f1 for red, f2 for green etc. Then type in your REM statement.

You can use different colours for procedures and functions and so on.

The other use of REM is when you are busy with your own program or especially when modifying someone else's to suit your particular needs.

Often you will want to cancel the effect of a program line. If you delete the line number you will lose the whole line and have to reload the program to regain it.

Rather, insert the above coloured REM statement after the line number which will highlight the line and which can be removed leaving the line operational again if you need it back.

Thank you for your magazine – a very necessary addition to my BBC Micro, most especially when relatively isolated as I am. – **Rod Borland, Natal, South Africa.**

Workshop success

I WOULD like to say that I am very grateful for the tip in Programmers' Workshop (June 1985) on reprogramming the character set ROM on the Epson FX80 printer.

I have made the suggested modification and am very satisfied with the results. It may be of interest to others contemplating this modification that for completeness I also moved the 11 bytes from &648 to &A80 for the italic £ sign.

It was nice not to require DP35 OC27,82,3 (Wordwise) for the above paragraph! – **Dave Moll, Faringdon, Oxon.**

Switching sound

THE statement by G.S. Thorpe in the March Micro User *about the *FX210,0 and *FX210,1 calls which switch sound on and off is misleading.*

If the sound is switched off before *a program is run, then it is difficult to think how it could be switched on directly by the *FX210,1 call while the program is running.*

However there are a number of relatively easy ways in which the calls can be incorporated in a program to allow the sound to be switched on and off at will during the running of a program.

These are most useful when the children start yelling at mum to turn her computer off, but would also be useful for teachers.

If the facility is to be incorporated into an existing program, the choice would depend on the structure of the program and the keys used in the program.

So far I have used the three ways below with success on a 1.2 OS.

For the Christmas Card listing in the December, 1983, Micro User *these lines were added to DEFPROCmusic:*

```
 1241 REM SPACE turns off s
ound
 1242 A%=INKEY(0):IF A%=32
THEN *FX210,1
 1243 REM RETURN restores s
ound
 1244 IF A%=13 THEN FX210,0
```

This allowed us to turn off the carols during dinner while the card played on in glorious Technicolor.

For an educational program

Troubles with a Demon

I AM pleased to see that you are publishing the names of companies who deal fairly with their customers.

However there are still those who do not, and I, like another reader of your magazine, have fallen foul of one of them.

Seven months later I am still trying to obtain a refund of my money. I would be grateful if you would publish my letter as a warning to your readers.

In mid-November I sent away for the Unicom Modem, as advertised in your magazine.

After numerous phone calls and several months, a Demon Modem arrived with a Unicom label. It did not work, and after ringing their B. Krite, Technical Enquiries, it was sent back.

Weeks passed and no reply, so I sent them a letter threatening legal action. Still no reply, so I placed the matter in the hands of my solicitor.

The enclosed letters, one from J. Jones, Chairman Rushworth Dales Ltd, and the other from B. Krite, Director, D.B. Enterprises, are the replies he received.

In his letter Mr Krite says Rushworth Dales own, and are fully responsible for, Unicom Ltd., the name of which they have now changed to What Peripherals Ltd.

In his letter Mr Jones says about the Unicom Modem: "As I understand the situation, D.B. Enterprises have no further commitment to component suppliers, only to purchasers".

The advertisement for the Unicom Modem states: "Unicom Limited, a joint Rushworth Dales-D.B. Enterprises Company".

I am concerned because I noticed an article in another magazine reviewing the Demon Modem. This had a Demon label, but the telephone number on the front was the same one as Unicom, and when I rang I was put in touch with M. Simon, the person who dealt with the Unicom Modem.

I would strongly advise your readers not to have anything to do with any product connected with Rushworth Dales Ltd, or What Peripherals Ltd. – **H. Lundie, Bromham, Beds.**

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

which uses a menu for selection of a number of activities, this method was adopted:

*The sound was set on with a *FX210,0 at the beginning of the program.*

"1. Sound ON/OFF" was printed as the first item in the menu. Then if the choice was 1 the line:

```
IF CHOICE = 49 THEN
PROCchoosesnd
```

directed control to:

```
1300 DEFPROCchoosesnd
1301 LOCAL G$,K$
1302 K$ = "YyNn"
1303 PRINT'''''SPC(2)"Sound
On ? (Y/N)"
1304 *FX15,1
1305 REPEAT:G$=GET$:UNTIL
INSTR(K$,G$)>0
1306 IF INSTR(K$,G$)>2 THEN
*FX210,1
1307 IF INSTR(K$,G$)<3 THEN
*FX210,0
1308 ENDPROC
```

The choice could then be made at the beginning of each new activity.

*It would probably be as well to include a *FX210,0 at the very end of the program to leave things as they were.*

The third method is more general and uses the PROCoscli procedure from Page 191 of the December, 1984, Micro User. Its use is illustrated in the "Gallery" typing program from The Micro User Education Special, issue No. 1.

Thanks again for a most interesting magazine. I get withdrawal symptoms if the mail is held up! – **Noreen Kennealy, Nedlands, Western Australia.**

```
2605 PRINT TAB(3,8)"At any
time after the game starts"
:PRINT''" You can turn the
sound off by pressing":
PRINT TAB(16,13) CHR$134
;CHR$136 ;"'@'":PRINT
TAB(1,16) "Pressing '@'
again will restore sound":
dummy%=GET: PROCtitle
2800 DEFPROCsound
2810 IF V% V%=FALSE:
PROCoscli( "FX210,1" ) ELSE
V%=TRUE: PROCoscli( "FX
210,0" )
2820 ENDPROC
2830 DEFPROCoscli(string$)
2840 LOCAL X%,Y%
2850 $&700=string$
2860 X%=0: Y%=7
2870 CALL &FFF7
2880 ENDPROC
```

Backstop stopper

FURTHER to my recent enquiry, which you kindly published in the May issue of The Micro User regarding a problem with my Cumana disc drive, since writing to you the problem worsened.

I returned the drive to the manufacturers and have just received it back and am pleased to say all is now well.

Apparently the problem lay with the backstop, which required re-setting.

As my problem had you "stumped", I thought I should let you know the outcome for future reference. – **C. Ward, Accrington, Lancs.**

● Thanks for the information. Even though we are occasionally stumped, it's nice to find out that people get their problems solved in the end.

Nordic characters

I NOTICED the letter about "Swedish characters" and I think Mr Wheeler must have bought his BBC outside Sweden.

There is as far as I know a "Nordic" ROM, supplied by Acorn, which will produce Icelandic, Swedish, Norwegian and Danish characters (modes 0-6).

I suppose that either Acorn or one of the Scandinavian users' clubs will know where to obtain this ROM. It has to be activated by special commands and the keys are modified, so you will need some overlays, to make use of it.

Secondly, there is a special teletext chip which, if inserted instead of the standard UK chip, will produce Mode 7 Scandinavian teletext characters (Swedish acctospec).

I have never seen that one myself and can thus not comment on its actual effect. The chip is Mullard SAA5052.

While I am temporarily in Egypt, I would like to find other BBC Micro owners. I can be contacted by telephone after 21.00 on 678233 in Heliopolis.

Has any reader perhaps managed to get Arabic characters in/out of the BBC?

Letters about this last would be gratefully received at my home address in the UK – 22 Marriotts Close, Felmersham, Beds, MK43 7HD – **Koenraad Rutgers.**

● Can any readers help with the Arabic characters?

Thousand and one

I FOUND Alan McLachlans' article "A cast of thousands" comforting, as it seems that I'm not the only one to spend hours trying to find the O that should be a zero or the I that should be a one.

You could probably make a small fortune if you marketed a forehead resistant VDU screen for those of us who, having corrected numerous self-inflicted typing errors, find one more.

Having said this and read the article, I think you could help. Surely it would not be a difficult matter to publish a sumcheck routine for use with your listings.

By printing the sumcheck at regular points in the listing many typing errors could be corrected before the program is RUNable.

Such a routine would have to disregard spaces, REMs, strings in quotes and the line number and line length bytes, as these can vary without affecting the running of the program.

Of course, there would still be many of us who spend hours correcting the sumcheck routine. – **D.H. Lockwood.**

● We've looked at the idea of a sumcheck routine before, and always found that the problems and limitations that came with them were worse than those they were supposed to solve!

However, we're always willing – and even likely – to be proved wrong. Anybody out there got a sumcheck utility for us?

Pointless but fun

I WILL start with the usual praise of your mag. I was quite impressed with Mike Cook's computer version of Mornington Crescent – it is an extremely good bit of pointless programming!

I was interested to read your review of the new DNFS 1.20, since I'm thinking of buying a 6502 second processor. There are, however, quite a lot of differences between the old 0.9 and the new 1.20 as far as disc drive operation is concerned.

The new chip will affect some old disc based games.

*For example some copies of Acornsoft's Snooker will not work properly with it. This is due to the fact that a *TAPE has been left out of the program where it downloads itself. Once this command has been added, however, it will work properly.*

When the old DFS was in operation, the length of the last file loaded was stored in address &C2. It is now stored in &C0.

This also applies to the load address of the last file, which was stored in &BE is now in &BC. (Thus all such useful addresses should be reduced by 2 – at least I think so.)

The practical upshot of this is that all that tape based software you so carefully put on disc will no longer work if you used a menu program like the one published in (dare I say it?) Beebug.

Well, now I've got that out of my system. (You can't imagine how depressing it is finding that all the programs you have on

→

MICROMAIL

From Page 155

disc will suddenly not work on the nice, new BBCs with the tapered keys, which make twice the noise of the old ones, for no good reason.)

I will add a comment about Elite.

A not widely known thing about the game is that it is possible to reveal the names of the authors. This is done by pausing the game, and typing Ctrl+X, then continue the game.

The next time the game returns to the original title page (with the rotating ship), the names of the two authors are displayed.

This command will also affect the game in other ways. Try, for example pressing Ctrl as the ship enters Hyper-space, keeping it depressed until it comes out . . . (This may only work on the disc game.)

I am trying to do the secret missions at the moment, but until I have more information, I will keep quiet. All I know at the moment is that the first one appears the next time you dock after having received your first "Right On Commander!" (which I always thought was 100 kills, not 256) when you are competent). – **Nick Clark, Southend.**

Adding an add-on

I'VE just installed a number of extras in my BBC Micro and feel that some of my observations may be of use to other dabblers.

The first add-on was a disc interface board. Following the instructions was not difficult and the DFS worked first time.

The hard part was getting the board seated properly – partly owing to the flexing of the main circuit board, but mainly because the keyboard connector protrudes over the DFS socket.

I believe in some BBCs the keyboard ribbon cable exits vertically from the connector, but in my case it came out over the DFS socket and fouled the DFS components.

A severe upward bend was introduced to overcome the problem but the cable is still hard up against the DFS board.

The second add-on I installed was a Watford Zif socket. I had decided that this would be less taxing on the power supply than a ROM board.

Just as well, because my micro has a large heatsink fitted to a chip due north of the ROM sockets, and this would have prevented the fitting of a ROM board.

I have not observed this heatsink in other BBC Micros.

The 28-pin header, being slightly larger than a ROM, fouls the capacitors which surround the ROM sockets.

The speaker support bracket fitted to later models prevents the fitting of the Zif socket, as do the speech-ROM expansion sockets (if fitted) beneath the ashtray.

Careful use of a junior hacksaw (cringe!) on the speaker bracket allowed the fitting of the board and the free passage of the ribbon cable.

The Zif board itself required some filing down to stop it from fouling the lock keys.

The one redeeming factor was that, once the lid was replaced on the micro, the Zif assembly was held firmly in place, so the sticky pad on the Zif board was unnecessary – which means that there should be no problem getting into the micro again as the Zif is not attached to the lid.

I hope my solutions give encouragement to would-be installers – but can't help wondering if it's just me that has problems!

Happy dabbling. – **Mike Reynolds, Southend.**

Running out of time

AS the owner of an Acorn 6502 second processor I found that it could behave rather strangely. In short, programs which worked 100 per cent on the single processor suddenly would not work properly and/or refuse to work at all.

This does not include programs with pokes into the screen memory. Naturally they would not work at all.

No, in my case simple Basic programs or even Acornsoft's own View crashed frequently when supported by the second processor.

Strange characters appeared at the graphics cursor position although no printing of characters was included in the graphics-only program, Mode 7 program's TAB instructions seemed to be coupled with a random number generator and View would crash with a complete loss of screen mode only recoverable with Break.

Other programs stopped with a lit Shift-Lock LED to indicate a Printer Buffer Full event (which it actually was – when switching on the printer to empty the buffer the programs continued after the buffer had freed itself from a lot of garbage).

You see that all this strange behaviour points in one direction – when juggling huge amounts of data between the two processors, as one does in graphics programs, a timing problem occurs.

The second processor already sends the next piece of code even though the first one has not dealt with his previous task. According to the OS's scanning algorithm this code then gets sent into the wrong channels.

When the Beebug magazine reviewed the new UCSD-p system they had some inexplicable crashes on their hardware.

Acorn said, after a short breather, that this was due to hardware incompatibility as some of their machines work at full capacity. So these timing problems might occur "especially when driven by very complex software like UCSD-p system".

Acorn also said that all their authorised dealers would be informed about this problem and could perform a hardware check. Any faulty hardware would then be exchanged free of charge. This notion is also supported by Acorn in Germany.

So if other owners of Acorn 6502 second processors have had the same problems, they now know what to do.

Secondly, some more bugs in

Good for a giggle, too

MAY I make a suggestion to P.R. Cuthbert ("Remember the Beginners", May, 1985)? Buy all the back issues and hang the expense!

By a lucky chance, my BBC and The Micro User *started up together, and I quickly learned to keep them together. The articles sort of kept pace with my learning, and I feel sure that the same would apply to other beginners even now.*

The only way to learn programming is by copying other people's programs and then debugging/changing them – just as Mike Bibby said.

I used to type in listings and then have to spend hours working out why they didn't work (and it was 12 months before I discovered TRACE [illegible]e gods!). And in the early days, I promise you, I had NO IDEA what I was up to.

It certainly provided the mental exercise Mr(s) Cuthbert is looking for.

One suggestion – Start only with the programs for which a descriptive breakdown is given.

The splendid wrinkles you get from Micromail, and the assorted short utilities alone make it worth buying the back issues (for example, January 1985, p.103, "Stringalonga") never mind the attractiveness of the underlying sense of fun, of not taking anything too seriously. (Find me another magazine that pokes fun at its readers – "Cast of 1000s" – knowing they'll just laugh). – **S.O. Clackson, Barcelona**

Acornsoft's View 1.4. Before editing lengthy documents with the EDIT command, it is absolutely necessary to NEW the memory.

Otherwise one gets the "Editing no file" message although the "fileout" exists. "Fileout" then cannot be deleted because one gets the message "Open". Break and start from scratch is the only cure.

Also View does not allow more than 10 characters for a filename. Files on another drive in a specified directory with seven letters for the name are refused with the message "Illegal command".

*File specifications like :1.C.THETEXT are not possible. Changing the drive or directory with the usual * commands is possible. Omitting the redundant specifications makes View accept the above filename.* – **Thilo Schrumpf, Lehrte, West Germany.**

Data understood

WHAT a delightful listing (June) Activities has turned out to be. I think at long last I am beginning to understand ways to access DATA.

My class at school have already enjoyed the program, although they do not realise the educational value of it.

However, all is not lost. I heard one of the more civilised characters remark: "Why do we have a cross through 'plate' when we have a party?"

Well, Perhaps not all of us eat our fancy cakes without one, so for those of us who require it line 10022 of the Activity listing should read:

```
10022 DATA have a party,7,
50,59,60,*
```

P.S. I have had a polite gentleman telephone to ask how to get Mornington Crescent to run after reading my last letter! – **Tony Lawrance, Leicester.**

● Thanks for the modification. I hope it will keep the class happy. We're all wondering what you said to the polite gentleman . . .

Field shift factors

THE explanation of field shift (Micromail, June) is not adequate to account for the following:

```
10 FOR A = 1 TO 20
20 PRINT ?&1E A;
30 NEXT
```

which does NOT cause field shift, despite the fact that &1E (=COUNT) still overflows MOD 256.

The crucial point is the absence of a comma in the print list, line 20. The fact that a space causes field printing is not documented, but the effect of a comma is – see the User Guide, page 324.

Commas in print lists CAN be tamed. For example:

```
20 PRINT A, A;
25 IF A MOD 2 = 0 THEN
PRINT CHR$(8)
```

which detects the end of each screen line, suppresses the screen-width auto linefeed, then does one of its own, thus resetting COUNT to zero for the next line.

This method is much preferable to tampering directly with one of Basic's "read only" variables – COUNT is of course a function (page 226) – especially as any attempt to alter it explicitly results in "Syntax Error"! – **Andrew M. Simpson, Perth, Scotland.**

Lost for words

I ADDED the Computer Concepts speech ROM to my micro fitted with a working Acorn speech system. The speech produced by this new ROM occasionally lost track and crashed the system in mid-sentence.

I experimented with the pitch control on the micro circuit board and found that setting it for a lower pitch speech cured the problem.

Perhaps this would be of use to somebody. – **H.M. Hoffman, London E9.**

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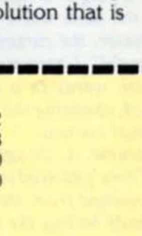

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MICROMAIL

£ for 1.2 version

I WAS interested in the Programmers' Workshop ROM fix to enable the Epson FX-80 to be used from the BBC computer in such a way that the £ key prints a £.

Your article concerned version 1.1. You may like to have the values which produce this result with version 1.2.

Changing the following bytes on the ROM to the following values will result in the £ sign being printed from the £ key in both the pica and italic scripts:

```
&1650-&1659:&8B &ED &FF &81
&7F &ED &7F &FD &7F &BD
&1C50-&1C59:&8B &ED &FF &E1
&9F &ED &7F &ED &7F &BF
```

If the DIP switches are now set to the USA character set then # will print as desired as well as the £.

You may also be interested to know that the Watford NLQ ROM lacks the # sign, as it has the £ printed from Ascii 35 rather than from Ascii 96.

It does seem surprising that a ROM designed for the BBC should not print what the keys say! If the following bytes in the eprom are changed to these values the printout will be # from Ascii 35, which is what the computer sends to the printer for #:

```
&E98-&E9F:&00 &24 &00 &00
&00 &00 &24 &00
&EA0-&EA7:&00 &FF &DB &00
&00 &00 &24 &00
&EA8-&EAF:&00 &24 &00 &00
&00 &DF &FF &00
&EB0-&EB7:&00 &24 &00 &00
&00 &00 &24 &00
&EB8-&EBB:&00 &00 &00 &00
```

And the following fix will put £ at Ascii 96:

```
&1A00-&1A01:&82 &16
&1A08-&1A0F:&00 &00 &02 &04
&10 &00 &04 &02
&1A10-&1A17:&10 &00 &04 &02
&38 &38 &06 &44
&1A18-&1A1F:&10 &00 &40 &04
&10 &00 &42 &00
&1A20-&1A27:&00 &02 &40 &00
&20 &42 &02 &00
&1A28-&1A2B:&20 &44 &00 &00
```

– S. Wilson, Wokingham, Berks.

● It is worth bearing in mind that there may be different versions of the NLQ ROM that the above fixes may not effect.

Joystick bender

I HAVE just received my April issue of The Micro User, and could not help but be amazed at the letters concerning Elite. So I feel it's my turn!

I bought my copy last Christmas in Amsterdam, and it returned with me to my temporary home in California, where I set upon becoming Elite.

A few hours were needed to master the controls, only I forgot the Space Skip key J. So many hours were spent flying from planet to planet – no quick jump for me.

Many a battle later I have obtained the status of Deadly with 26800 credits and all the equipment. And still going strong.

My only complaints are the constant repairs to my joystick and the complaints from my wife about the time I spend with the computer.

This is the best software I have seen on any computer. Well done Acorn, from a very happy nearly-Elite engineer. **– T.L. Bushell, Lancaster, Ca, USA.**

And finally, with tongue firmly in cheek . . .

Financial repercussions

Dear Trev,

Why isn't life simple? How come when I'd just got Andrea round to believing that a second processor would help with her bellringing does Acorn go and do it?

I arrived home the other night to find the spare bedroom unbelievably tidy. There wasn't a plug or a wire in sight and, curled up on the table where my Beeb should be, was Buster, the cursed cat.

"Aaggh!" I screamed (I always have a way with words in a crisis). "Aaggh!", I repeated, changing the emphasis but not the emotional content.

Of course, A. thought I was referring to her. "There's no need to yell at me like that", she screamed from the kitchen, where she was busily boiling the beetroots and lentils that have been our staple diet ever since she bought Vegesoft's "Meat Haters Menu Planner".

"My Beeb," I finally got out, "where's my Beeb".

"I've given it to Nigel", she purred, looking uncannily like Buster in his younger ,two-eyed days. "You won't need it now Acorn's gone bust".

At this point I resorted back to my "Aaggh!". It may not mean much but it summed up my feelings perfectly. Poets have died wishing they had such eloquence.

"Who told you they'd gone bust?"

"Robina Crow".

Dread filled my heart. Robina was a "computer journalist" who had recently moved into Romchester and had joined the Bellringers.

About the only good thing about her was that A. hated her on sight. She maintained that ever since Robina had joined the ringers she'd got the short end of the rope. I told her to pull the other one, which resulted in a record-breaking stoney stare. (I'm thinking of writing an adventure game called Medusa.)

"Well, what does she know about it?"

"Everything. She edits a computer magazine, Probably Completely Worthless".

"But people who work for micro magazines know nothing about computers. It's the first thing you learn".

"Well she does. And she says Acorn's finished, even after the £65,000 she's given them to help their finances. But she was wrong about one thing".

"What's that?" I seethed, casually ripping the telephone directory in half.

"She said that you couldn't give a BBC Micro away, but I just did".

At that I made my excuses and left, running hotfoot to nasty nephew Nigel's.

"Where's my Beeb, you little crook?" I screamed caressing him round the neck.

"It's my Beeb now", he gasped "you can have my Electron if you want, it's got rarity value".

I tightened my grip persuasively and, after due consideration, he reversed his decision.

"OK. OK. it was a joke. Your Beeb's not here, it's at your house. Auntie Andrea's hidden it". I hurtled back to find A. on the phone to Nigel, stopwatch in her hand.

"Twenty three seconds going, twenty one coming back. He's improving".

"Why did you do it?" I wept as I was reunited with my Beeb.

"Well you did tell me to pull the other one".

So you can see that things have been a bit tense at home. We are, however, talking and I was able to tell her about Olivetti's rescue package.

I wish I hadn't. I've had pasta every meal for a week. Mind you, Clive says I should be used to it since my programs are like spaghetti.

I suppose I should be glad it wasn't Fisons.

Cheers,

Bob

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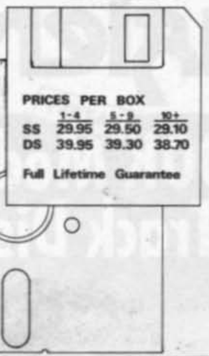

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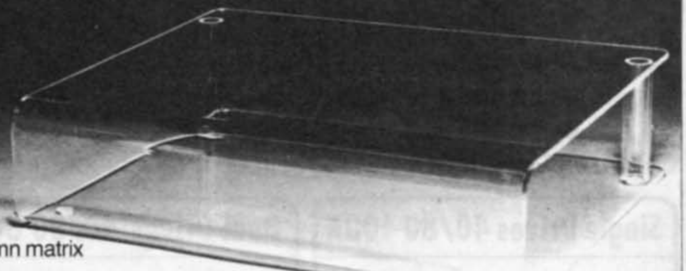

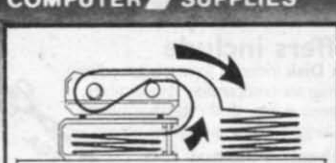

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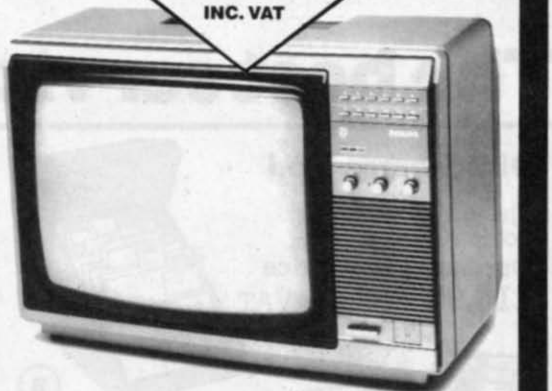

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- Aerial supplied
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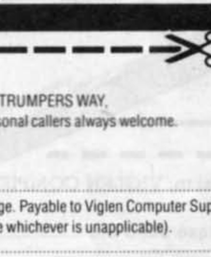

Open 9.30 – 6 weekdays,
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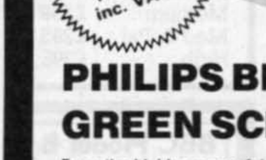

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This diskette storage holds 70 diskettes

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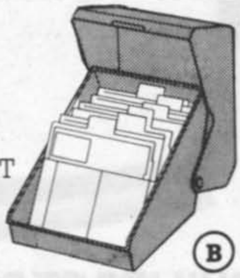

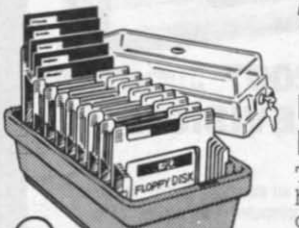

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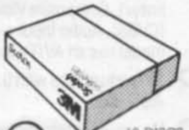

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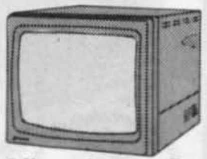

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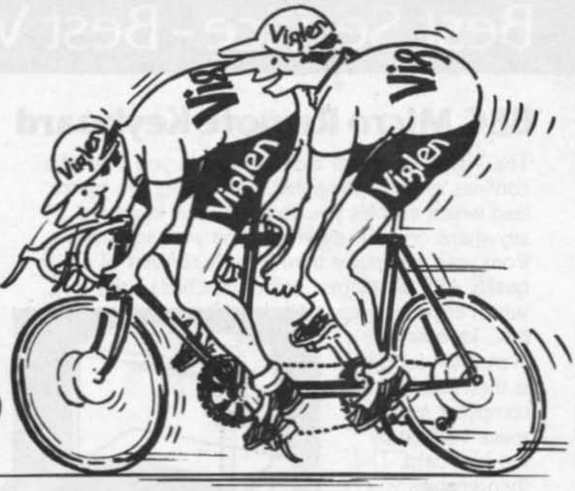

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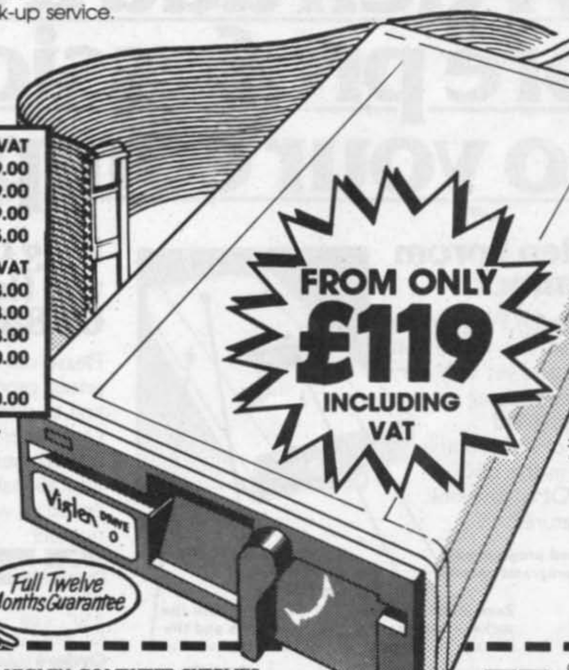

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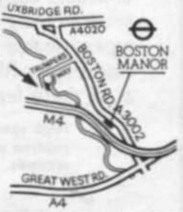

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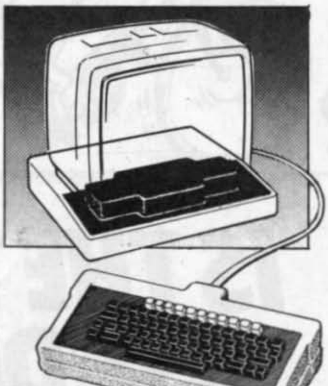

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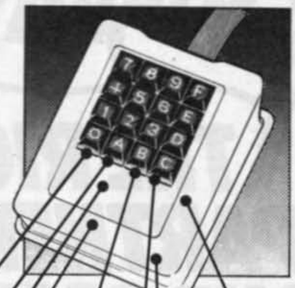

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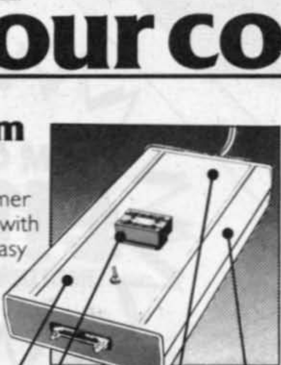

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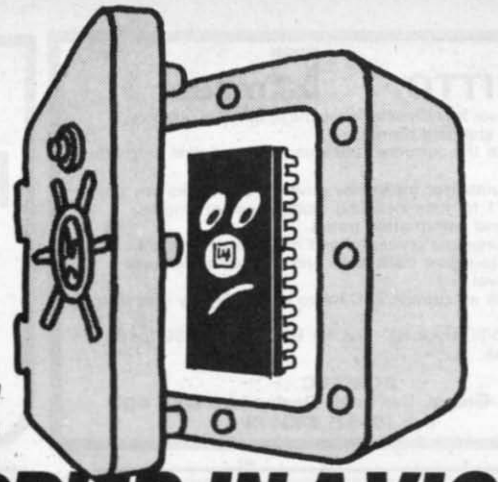

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There are two systems – the 'Standard' and the 'Low Profile'. Viglen is the leading producer of both.

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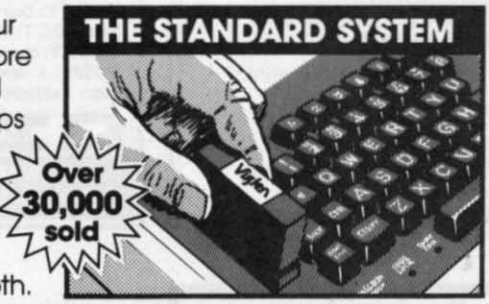
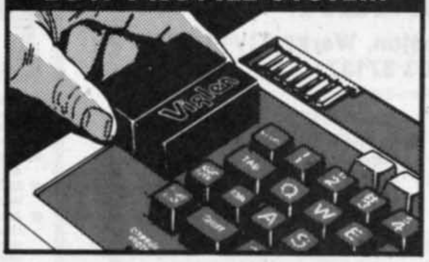


The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

LOW PROFILE SYSTEM



With the sideways entry on the low profile system access to the escape and tab keys are slightly restricted. However Viglen betters its rivals in this respect by being 3mm lower.

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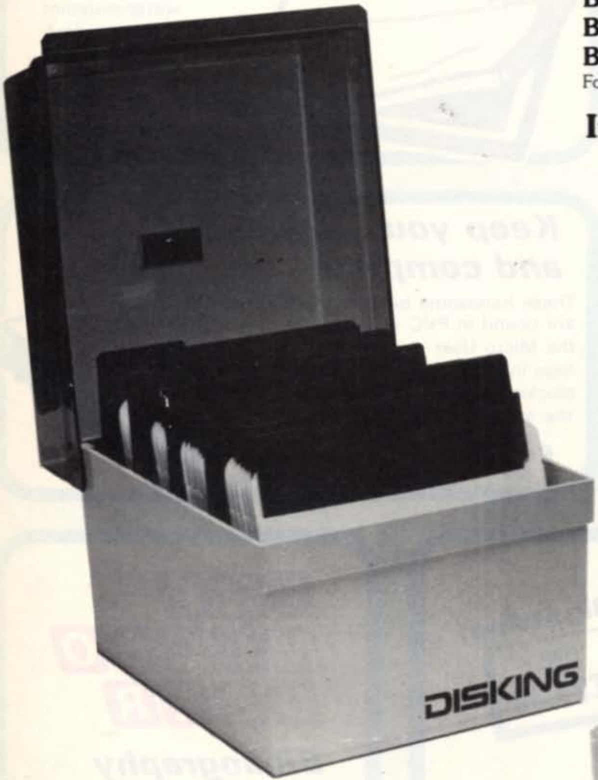

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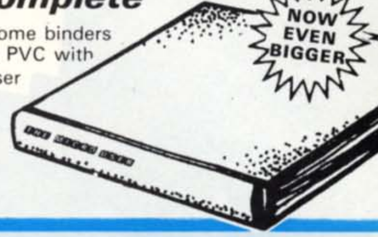

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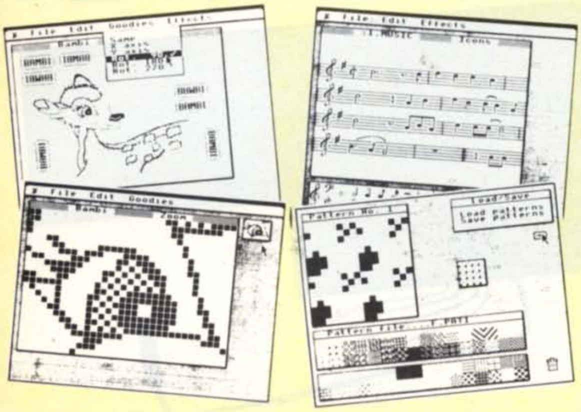
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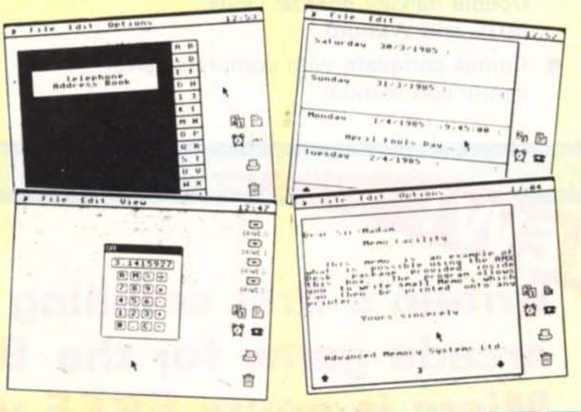
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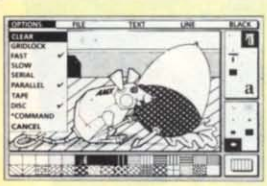
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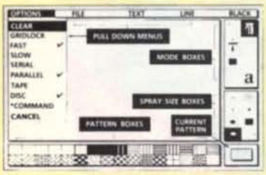
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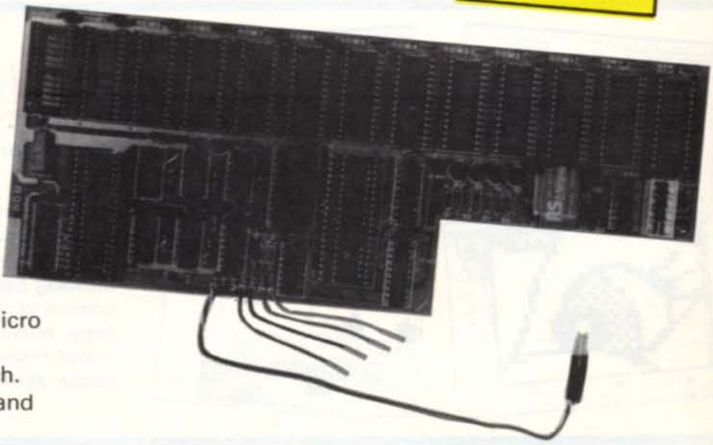

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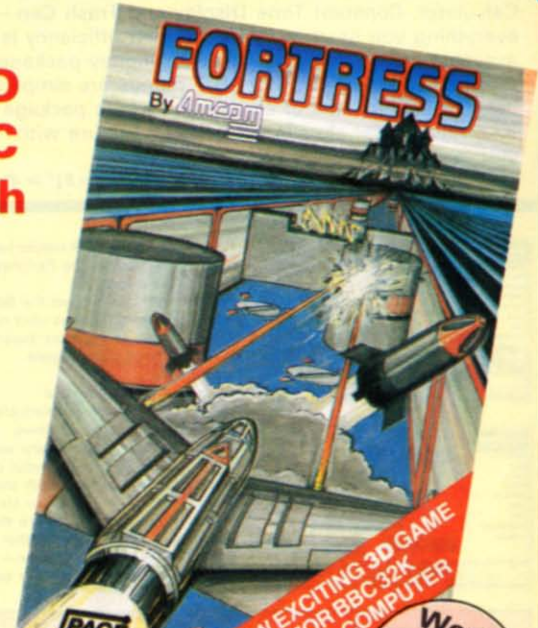
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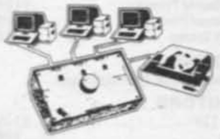

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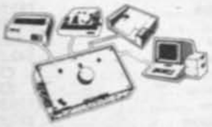

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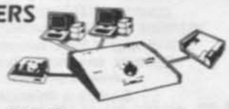

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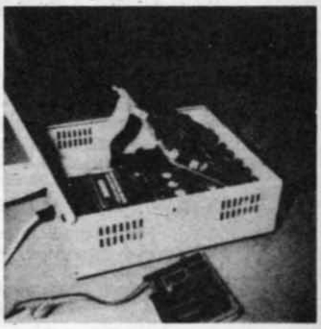

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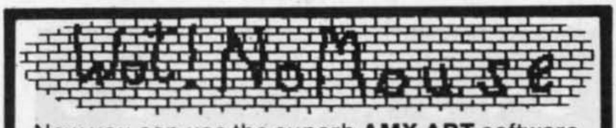

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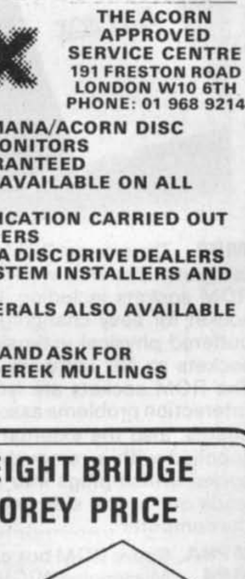

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The ideal companion ROM for **Solidisk**, **RAMAMP** and other sideways RAM/ROM users. The **MENU** features **ROMLOAD & ROMSAVE** of sideways software and is virtually instantaneous in operation!

Security backup:

Will create backup copies of ALL protected discs. Single or dual drive operation, this utility is fast and intelligent in operation. It does not require the user to 'investigate' the disc to be copied. *Disk version: see below*

40/80:

Will convert any 40 track disc into 80 track while retaining all files on disc. Eliminates the need for switchable drives and has the added bonus of increasing disc capacity by up to 200K.

Discmend:

Reads the entire disc searching out disc errors and repairing any sectors/tracks found to be defective.

Disc indexer:

This utility will read the catalogue information from ALL of your discs, sort the filenames into alphabetical order and produce a master index with each filename matched to its corresponding disc title. The master index can be printed immediately and/or saved to a disc as an ASCII file. The ASCII file can by * TYPED and can also be ammended using any popular wordprocessor.

Fast save and load:

Auto-SAVEs developing programs with one command, *MS, updating its filename by incrementing the last letter. Auto-LOADs the latest version on disc with *ML.

Fast format:

Will format your discs to 40 or 80 tracks, single or double sided. Sectors on successive tracks are ordered to improve the access speed of the DFS.

Fast verify:

This utility does not abort on finding a bad track but verifies the whole disc indicating good tracks in green and bad tracks in red.

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We accept orders from all government bodies, schools, universities, libraries, armed forced etc. We despatch on receipt of an official order. If you're not a government body and can't raise a cheque without an invoice, just post or telephone your order and we'll send you a pro-forma by return.

NEW!

Our Security Backup feature also on DUAL FORMAT disc. This powerful disc utility will copy any protected disc for the BBC MICRO and will even copy discs used on other computer systems!

owl software

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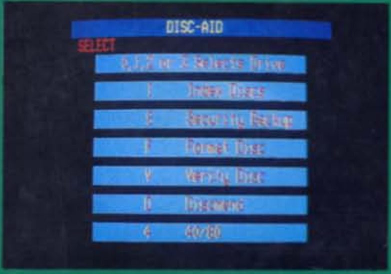
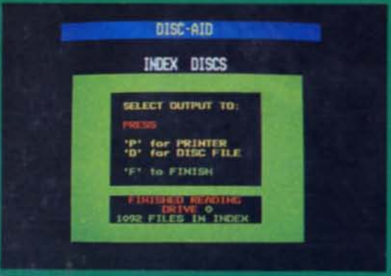
DEALER ENQUIRIES WELCOME



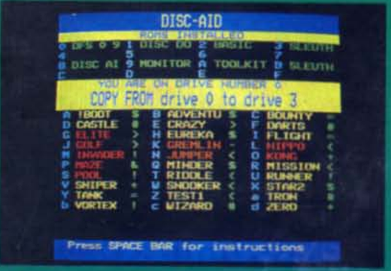


```
DISC-AID

INDEX  DISCS

SELECT OUTPUT TO:
PRESS
'P' for PRINTER
'D' for DISC FILE
'F' to FINISH

FINISHED READING
DRIVE 0
1092 FILES IN INDEX
```



```
DISC-AID
ROMS INSTALLED
0 DFS 0.9  1 DISC DO  2 BASIC    3 SLEUTH
4          5          6          7
8 DISC AI  9 MONITOR  A TOOLKIT  B SLEUTH
C          D          E          F
YOU ARE ON DRIVE NUMBER 0
COPY FROM drive 0 to drive 3
A !BOOT    $  B ADVENTU $  C BOUNTY
D CASTLE      E CRAZY   >  F DARTS
G ELITE    >  H EUREKA  $  I FLIGHT
J GOLF     >  K GREMLIN -  L HIPPO   <
M INVADER  !  N JUMPER  <  O KONG
P MAZE     &  Q MINDER  $  R MISSION <
S POOL     !  T RIDDLE  <  U RUNNER
V SNIPER   +  W SNOOKER <  X STAR2   $
Y TANK     =  Z TEST1   <  a TRON
b VORTEX   !  c WIZARD     d ZERO    +

Press SPACE BAR for instructions
```

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REPTON

REPTON
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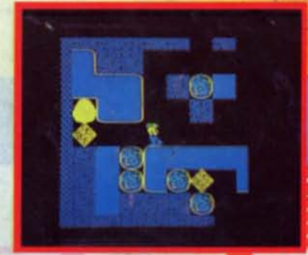
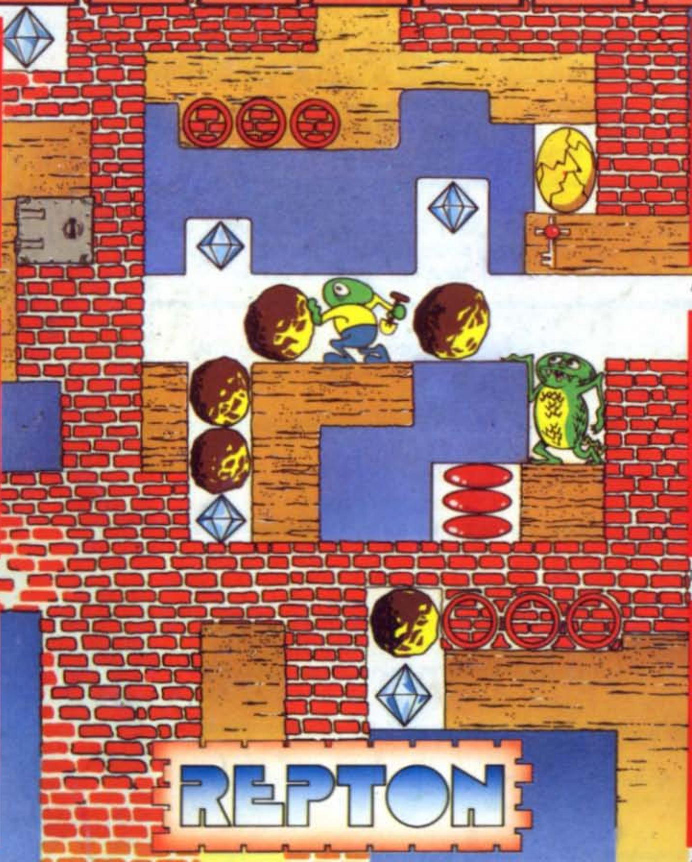
Press SPACE BAR.

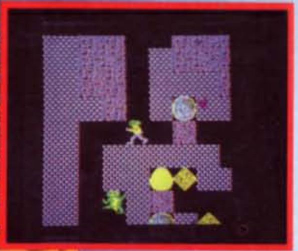
THE INTRODUCTORY SCREEN



AN EGG ABOUT TO HATCH

SCREEN L





A LURKING REPTILE

THE MAP (SCREEN H)

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BBC MICRO

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Access

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(1) All our software is despatched within 48 hours by first-class post.
(2) In the unlikely event that any of our software fails to load, return your cassette to us and we will immediately send a replacement.